A STUDY ON SHRINKAGE DISTORTION
OF BUTT WELD

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XIII-A May 1969

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Submitted in partial fulfillment of the requirements
for the Degree of Master of Science and Naval Engineer
at the
Massachusetts Institute of Technology
June, 1969

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ABSTRACT

In a welded structure, shrinkage and external constraint are closely related. Shrinkage decreases as Degree of Constraint increases.

In the first part, this paper presents:
(1) a formula that can be used to find the transverse shrinkage of a free joint in the case of a butt weld,
(2) the definition of the degree of constraint of restrained structures,
(3) the empirical correlation between transverse shrinkage and degree of constraint.

In the second part, this paper presents:
(1) analytical formulae for the degree of constraint of some simple joint configurations,
(2) the numerical method for the degree of constraint of other joint configurations and the tabulation of the results obtained.

In the last part, the use of the degree of constraint to determine the cracking susceptibility of a welded structure is suggested and a method of experimentation to verify the numerical results obtained in the second part is proposed.

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ACKNOWLEDGEMENTS

The author expresses his profound gratitude to Prof. Koichi Masubuchi whose constant guidance and encouragement are most valuable; to Prof. Sherman C. Reed for his discreet solicitude; to Prof. Jerome J. Connor and Mr. George T. Will of the Civil Engineering Department whose help in the computer programming are most crucial; to Prof. Norman Jones and Prof. Alaa E. Mansour whose offices are always widely open for free consultations; to Prof. Theodore H. Pian of the Aeronautics and Astronautics Department for his generous and enlightening assistance.

Table of Contents

Appendices

Transverse Shrinkage Computations

List of Illustrations

SUMMARY

Distortions and residual stresses unavoidably accompany every welded structure. They are not independent of each other. In the case of an unrestrained structure, the shrinkage distortion is determined by the welding heat and can be determined. However, practical structures are seldom completely free and welding is performed more or less under external constraint, therefore it seems that if factors relating to welding heat are definite, the ratio of shrinkage distortion under external constraint to the one in a free welded joint is uniquely decided by the degree of external constraint to which weldments are subjected, or:

(shrinkage under external constraint, S_t) = (shrinkage in free welded joint, S_{tf}) x F_c

where F_c is a function depending on the degree of constraint. S_{tf} is the transverse shrinkage of the unrestricted joint or free joint. For a butt joint, S_{tf} has the following expression:

$$S_{tf} = C_1 \frac{A}{h^2} \log_e \frac{W}{W_o} + C_2 \left(\frac{A}{h^2}\right)^{1/2}$$

where:

A = sectional area of the groove of the butt joint,

h = plate thickness,

W = weight of deposited metal per unit weld length,

W_o = weight of deposited metal per unit weld length per welding of each pass, and

C_1 and C_2 are coefficients depending on arc voltage, arc current, arc efficiency, filler metal diameter, and melted weight of rod per unit current and unit time.

For example with the Ilumenite type filler rod of 3.2 mm diameter, with weld current of 120A and welding speed of 0.3 cm/s, it has been found that in the C.S.G. unit system:

$$C_1 = 0.0960, \quad C_2 = 0.0416$$

In this order of idea, Masubuchi has defined the degree of constraint as:

$$\text{Degree of Constraint}, K = \frac{\text{Uniform transverse stress, } \sigma_{y_o}}{\text{Average Transverse Displacement} [\bar{v}]_\ell} \tag{1}$$

where $[\bar{v}]_\ell$ is the average of the transverse displacement taken along the weld length ℓ, and has found a graphical correlation between transverse shrinkage and degree of constraint K (references 1,2).

Later, Watanabe and Satoh, after analyzing the experimental results obtained by Masubuchi and others, have found a correlation of the form:

$$\frac{S_t}{S_{tf}} = \frac{1}{1+ 0.086K^{0.87}} \tag{2}$$

therefore, in order to determine the shrinkage distortion, the value of K must be known.

On the other hand external constraint promotes stress. In fact, the level of stress can be found by combining (1) and (2):

$$\sigma_{y_o} = K[\bar{v}]_\ell$$

and for a butt weld, $S_t \approx [\bar{v}]_\ell$ for an actual weld. Therefore:

$$\overline{\sigma_{y_o}} = S_{tf} \frac{K}{1+0.086K^{0.87}}$$

$\overline{\sigma_{y_o}}$ is the average reaction stress along the weld due to constraint

If the external constraint is too high, residual stress can reach a dangerous level where cracking can occur. Here again, it is essential to know K.

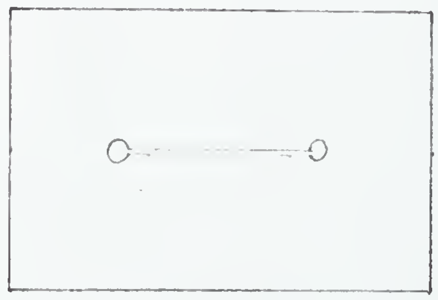
In a few cases, K can be found analytically. But in most practical cases, it has to be computed numerically.

The object of this study is to compute numerically the values of K for some test specimens and to propose a method of experimentation to verify the computed results. Also the degree of constraint in the case of patch weld has been determined analytically.

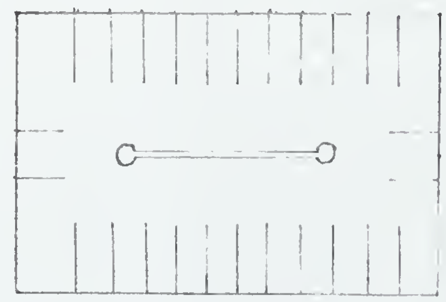
The numerical method used is the finite element method in which the plate structure is divided into small elements in each of which static equilibrium and geometrical compatibility have to be satisfied. In this case, for each specimen the values of K are computed as a function of $R = \frac{\ell}{L}$ where ℓ is the weld length (in this case, it is the length upon which the uniform stress σ_{y_o} acts) and L is the length of the slit. The results are presented as the non-dimensionalized degree of constraint $\bar{K} = \frac{K}{(E/L)}$ (E is the modulus of elasticity) curves versus $R = \ell/L$ in the attached

diagram (Figure 9).

One exception is made in the case of the Lehigh test specimen where the weld is made all along the length of the slit



without saw cut



with saw cut

(ℓ=L, R=1.0). In these cases, experimental data are available for comparison:

	$K_{computed}$*	$K_{measured}$	% $\dfrac{K_{computed}-K_{measured}}{K_{computed}}$
No Sawcut	45.3 Kg/mm^2-mm	44 Kg/mm^2-mm	2.87
With Sawcut	28.9 Kg/mm^2-mm	27 Kg/mm^2-mm	6.70

*Assuming $E = 19.9 \times 10^3$ Kg/mm^2

The object of the Lehigh test specimen is to find the critical value of K or range of values of the degree of constraint above which weld cracking may develop, below which it may not. The analytical results obtained in the case of a patch weld, which consists of a circular disc welded to a plate, are for the case of a plate with large dimensions (infinite plate):

Patch Weld

(1) If the weld can be made along the whole circle in one pass, then:

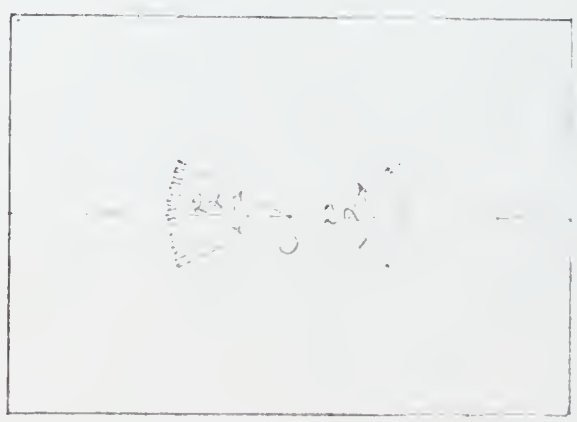
$$K = \frac{\sigma_R}{u_R} = \frac{1}{2}\,\frac{E}{R}$$

R is the radius of the plate,

σ_R is the radial stress of the perimeter of the disc, and

u_R is the radial displacement at the weld.

(2) If the weld can be made within a sector 2α, then:



$$K = \frac{\sigma_R}{[\bar{u}_R]_{2\alpha}} = \frac{\Pi E}{2\alpha R} \times \frac{1}{2-f(2\alpha)}$$

where $[\bar{u}_R]_{2\alpha}$ is the average radial displacement over the welded sector 2α and $f(2\alpha)$ is a series function of 2α with $f(0)=f(\Pi)=0$ and

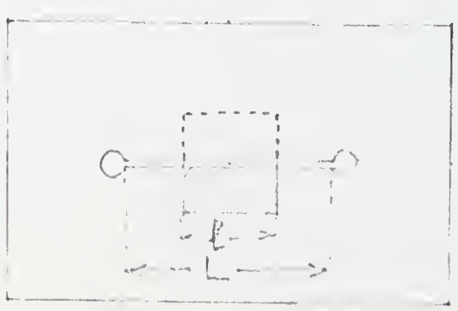
the series converges as $\frac{1}{n^2}$.

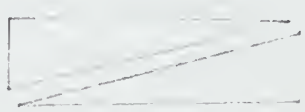
Because of the linearity of the relations in elastic deformation, the displacement is inversely proportional to the modulus of elasticity E, and K, which is defined as a stress divided by the corresponding average displacement, is proportional to E. Therefore a new factor, called specific degree of constraint K', and defined as:

$$K' = \frac{K}{E}$$

is independent of the linear elastic material and dependent only on the geometry of the weld.

Therefore experiments to determine the values of K to verify the computed results can be conducted on any linear elastic materials, preferably the ones that have small E and are not expensive. Plastic materials are proposed, and a mechanical way to stress the specimens is to drive two wedges to make an assembly





wedge shape

with parallel faces into the slit. Each specimen will have several sets of wedges with different widths ℓ so that K' can be found as function of $R = \frac{\ell}{L}$. Strain gauges put near the edges of

the slit and visible marks made at the immediate vicinity of the edges for optical measurements by microscope or comparator are used to determine stresses and displacements. In these experiments the material at the loading zone is in compression instead of tension as in the welding. It is of no consequence as far as the material is linear elastic in compression. It is actually, and the value of E is between 3 to 5 x 10^5 psi (in compression).

The problem of shrinkage control could be conceived as a problem of choice between two alternatives, based on the degree of constraint K:

$$K = \frac{\sigma_{Y_o}}{[\bar{v}]_\ell}$$

and the Watanabe-Satoh relation:

$$\frac{[\bar{v}]_\ell}{S_{tf}} \simeq \frac{S_t}{S_{tf}} = \frac{1}{1+0.086\ K^{0.87}}$$

S_{tf} is the transverse shrinkage of a free joint and for a butt weld, $S_t \simeq [v]_\ell$ at the weld. These alternatives are either to limit the shrinkage by increasing the external constraint, and thus accept a higher value of K and hence a higher level of residual stress or to reduce the residual stress level by relaxing the external constraint thus reducing the value of K and to accept a larger value of shrinkage distortion.

In the problem of cracking control, it is essential that the external constraint will result in a value of K below the range of critical degree of constraint K_c, characteristic of each material and each weld type.

In these two problems, the important factor is the degree of constraint K.

INTRODUCTION

I. General

Welding is an efficient method of fabricating structure. Various products ranging from miniature electronic components to bridges, ship hulls, rocket motor cases have been made by welding.

One of the troublesome problems that accompany the construction of welded structures is shrinkage distortion. The more complex the structure is, the more involved the problem becomes. Shrinkage distortion can cause mismatch of joints which leads to the possibility of welding defects.

The correction of weld distortion is costly and in some cases impossible. It is therefore desirable to develop some techniques to predict somehow the approximate values of the shrinkage distortion in order that palliative measures can be devised that will neutralize or reduce the effect of shrinkage distortion.

Another problem associated with welding is cracking. Cracks may form as a result of the welding operation and can occur within the weld metal or the base metal in the heat-affected zone.

There are two types of cracking that are experienced in

welding: hot cracking and cold cracking. Hot cracking is believed to take place during the solidification of the weldment and can occur in the weld metal or in the heat affected zone. Hot cracks are of intergranular type. Cold cracking occurs at much lower temperatures than does hot cracking, in steels at temperatures below the start of the austenite-martensite transformation. Cold cracks may be formed during or after the welding operation; cold cracks are of transgranular type. Cracking, hot or cold, depends on many factors such as chemical composition of the base and filler metals, mechanical restraints, welding condition (heat,input). For given welding conditions, chemical compositions of the base and filler metals, it is desirable to develop a way of determining quantitatively the degree of restraint that may promote cracking.

II. Technical Background

Distortion in a welded structure may be determined as a function of structural parameters, material parameters and fabrication parameters.

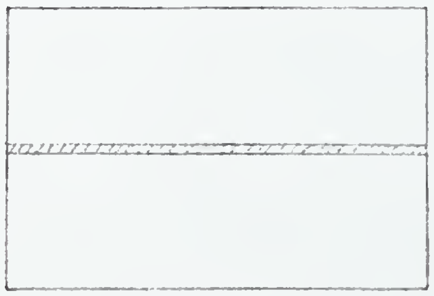
The structural parameters include the geometry of the structure, the shape of the joining boundary and the type of the joint.

The material parameters are the nature of the base and filler materials.

The fabrication parameters include the welding process, the heating procedure, the welding sequence, the degree of

constraint.

The degree of constraint, which will be the principal object of this study, is a parameter which characterizes the external mechanical constraint to which a weld is subjected. For example, the degree of constraint of a weld made throughout along the median line of a rectangular plate, case (a),



(a)

(b)

is different from that of a weld made only partially along this line, case (b). In fact, in case (a), the weld can be considered to be free while in case (b), it is not. And in case (a) the shrinkage is larger than in case (b) and we can imagine that there should be a relation between shrinkage and degree of constraint.

According to Masubuchi (reference 2), to analyze weld distortion, it is necessary to establish analytical relationships among these three sets of parameters and distortion.

For a simple butt weld as is the case of this study, the dimensional changes produced in the structure by each weld are to be determined. This can be done by:

(1) Analyzing the heat flow,

(2) Analyzing the thermal stresses during welding to determine incompatible strains, and

(3) Determining the dimensional changes.

In fusion welding, a weldment is locally heated by the welding heat sources. During the thermal cycle, the weldment is subjected to thermal stresses. When the weld is completed, incompatible strains are created in the region near the weld. Incompatible strains, including dimensional changes associated with solidification of the weld metal, metallurgical transformations, and plastic deformations, are the sources of residual stresses and distortion. When welding processes and parameters are changed, the heat flow pattern is also changed causing a change in the distortion of incompatible strains, hence in shrinkage and distortion.

The problem of determining the distribution of incompatible strains is extremely difficult. When a material undergoes plastic deformation, the stress strain relationship is not linear. Furthermore, plastic properties of the material change with temperature.

When the incompatible strains are known, theoretically or experimentally, the problem of determination of dimensional changes can be handled analytically. Moriguchi has developed a fundamental theory of stresses caused by incompatible strains, and Masubuchi has applied Moriguchi's theory to the study of residual stresses and distortion due to welding.

Assuming that the dimensional changes in welds are determined, either analytically or experimentally, the next step is to determine the distortion induced in the structure by these dimensional changes. Although plastic deformation is produced in small areas

near the weld, most of the remaining material in the structure is elastic. Consequently, the induced distortion can be analyzed by using the elastic assumption. Hence the relations used to determine the induced distortion are independent of fabrication parameters and depend only on well-established material parameters.

A. <u>Changes of Temperature and Stress During Welding (from reference 2)</u>

Figure 1 shows schematically how residual stresses are formed in a weld. Figure 1a shows a bead-on-plate weld in which a weld bead is being laid at a speed v. O-xy is the coordinate axis; the origin, O, is on the surface underneath the welding arc, and the x direction lies in the direction of welding.

Figure 1 shows temperature distribution along several cross sections. Along Section A-A, which is ahead of the welding arc, the temperature change due to welding, ΔT, is almost zero (Figure 1b-1). Along Section B-B, which crosses the welding arc, the temperature distribution is very steep (Figure 1b-2). Along Section C-C, which is some distance behind the welding arc, the distribution of temperature change is as shown in Figure 1b-3. Along Section D-D, which is very far from the welding arc, the temperature change due to welding again diminishes (Figure 1b-4).

Figure 1c shows the distribution of stresses along these sections in the x direction, σ_x. Stress in the y direction, σ_y, and shearing stress, τ_{xy}, also exist in a two-dimensional stress

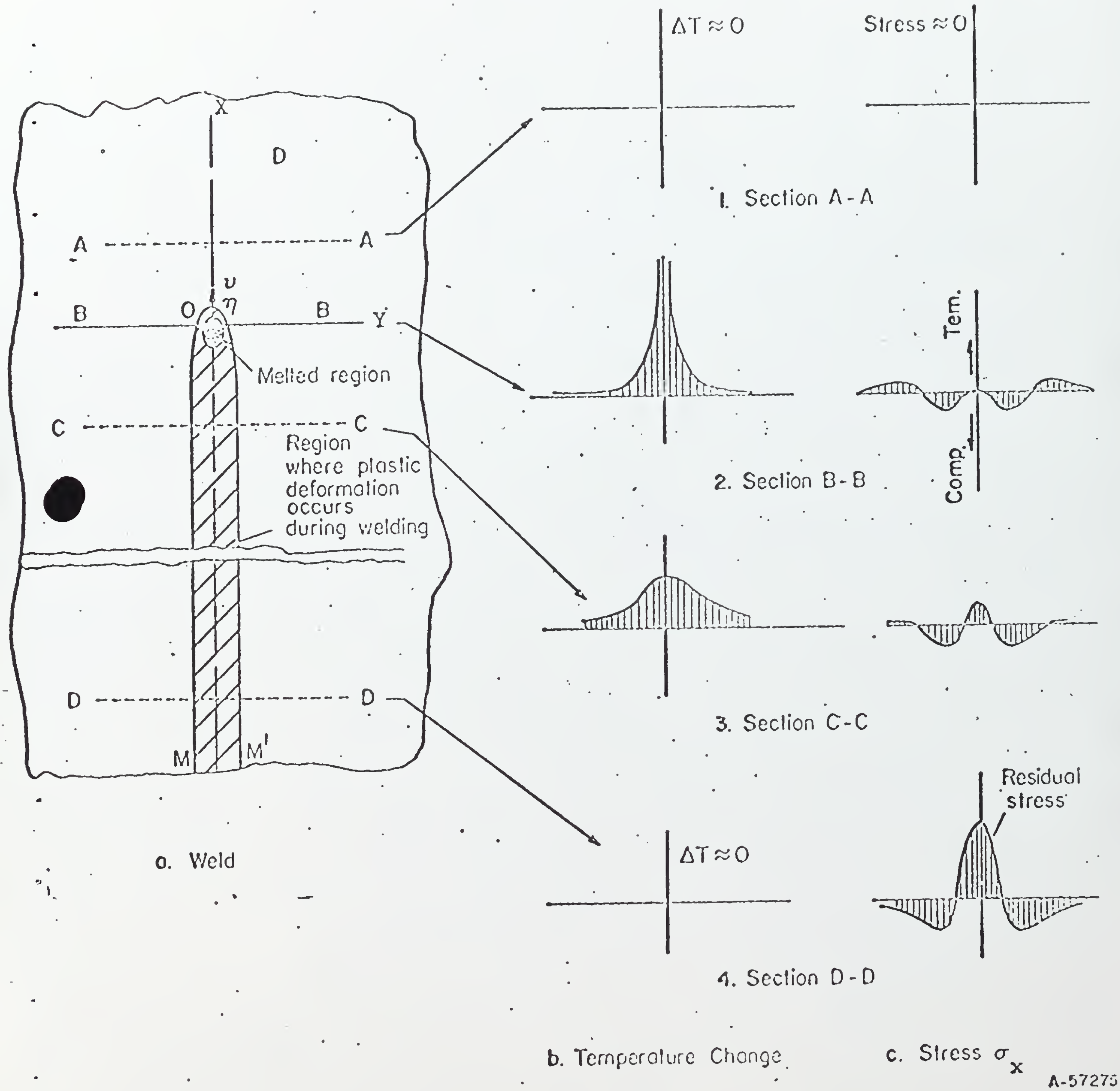


FIGURE 1. SCHEMATIC REPRESENTATION OF CHANGES OF TEMPERATURE AND STRESSES DURING WELDING.

field (Figure 1a).*

Along Section A-A, thermal stresses due to welding are almost zero (Figure 1c-1). The stress distribution along Section B-B is shown in Figure 1c-2. Stresses in areas underneath the welding arc are close to zero, because molten metal does not support loads. Stresses in areas somewhat away from the arc are compressive, because the expansion of these areas is restrained by surrounding areas that are heated to lower temperatures. Since the temperatures of these areas are quite high and the yield strength of the material is low, stresses in these areas are as high as the yield strength of the material at corresponding temperatures. The amount of compressive stress increases with increasing distance from the weld or with decreasing temperature. However, stresses in areas away from the weld are tensile and balance with compressive stresses in areas near the weld. In other words,

$$\int \sigma_x \cdot dy = 0 \tag{a}$$

across Section BB.** Thus, the stress distribution along Section BB is as shown in Figure 1c-2.

Stresses are distributed along Section C-C as shown in

---

*In a general three-dimensional stress field, six stress components, σ_x, σ_y, σ_z, τ_{xy}, τ_{zy}, τ_{zx} exist.

**Equation (a) neglects the effect of σ_y and τ_{xy} on the equilibrium condition.

Figure 1c-3. Since the weld-metal and base-metal regions near the weld have cooled, they try to shrink causing tensile stresses in areas close to the weld. As the distance from the weld increases, the stresses first change to compressive and then become tensile.

Figure 1c-4 shows the stress distribution along Section D-D. High tensile stresses are produced in areas near the weld, while compressive stresses are produced in areas away from the weld. The distribution of residual stresses that remain after welding is completed are shown in the figure.

The cross-hatched area, MM', in Figure 1a shows the region where plastic deformation occurs during the welding thermal cycle. The cross-hatched area near the origin 0 indicates the region where the metal is melted. The region outside the cross-hatched area remains elastic during the entire welding thermal cycle.

Because of the difficulty in determining the distribution of incompatible strains, no analysis has yet been developed to trace the change of two-dimensional thermal stresses during welding and to determine distributions of three residual-stress components, σ_x, σ_y, and τ_{xy}. In other words, no analysis has been made in which both heat flow and stress fields are treated as two-dimensional problems. In all studies conducted so far, the problem has been simplified in some way.

B. Shrinkage Distortion

Shrinkage distortion in welding can be considered as the

result of the combination of two groups of factors:

(1) Factors related to welding arc, arc voltage, welding current, welding speed, type and size of electrode,

(2) Factors related to external constraint.

1 - Effect of Welding Heat

The effect of welding heat on the transverse shrinkage in the case of butt weld free of external constraint is known in the form:

$$S_{tf} = C_1 \frac{A}{b^2} \operatorname{Log} \frac{W}{W_o} + C_2 \left(\frac{A}{b^2}\right)^{1/2} \quad (1)$$

where

S_{tf} is the transverse shrinkage of the free joint,

A is the sectional area of groove of the butt joint,

b is the thickness of the plate,

W is the weight of deposited metal per unit length of the weld,

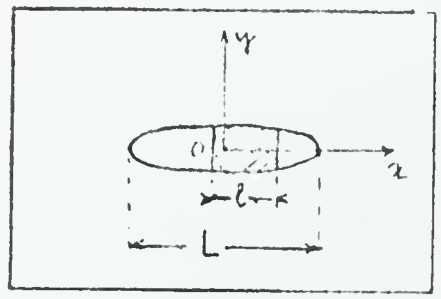
W_o is the weight of deposited metal per unit length of the weld in one pass, and

C_1 and C_2 are constants depending on the arc voltage, arc intensity, heat efficiency of the welding arc, size and type of the filler metal and the melted weight of the rod per unit current and unit time.

2 - Effect of External Constraint

In practical work, welding is performed more or less under external constraint. In this case, shrinkage distortion in weld metal is depending also on the mechanical constraints and smaller

than in free joints. In their work, Kihara and Masubuchi attempted to determine quantitatively the degree of constraint and, in a slit weld, to find a relation between transverse shrinkage and degree of constraint.



0 is the center of the plate

Accordingly, the degree of constraint K is defined as:

$$K = \frac{\sigma_{y_o}}{[\bar{v}]_\ell} \tag{2}$$

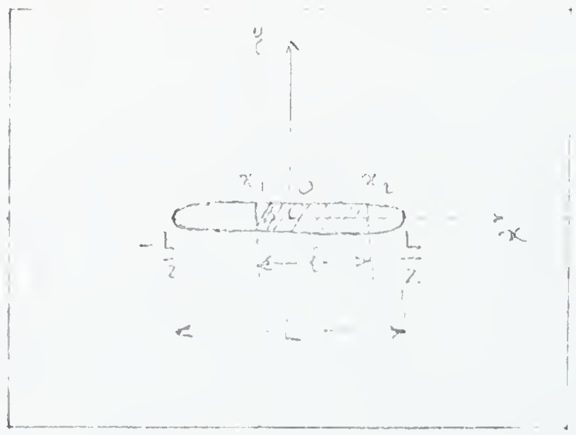
where ℓ is the length of the weld in a slit of length L, σ_{y_o} is the uniform stress applied along the weld length ℓ and $[\bar{v}]_\ell$ is the corresponding mean value of transverse displacement over the portion of the slit where the load is applied. The physical meaning of K is that when uniform transverse stress σ_{y_o} is applied along the part of the slit between $x=x_1$ and $x=x_2$, $(|x_2-x_1| = \ell)$ displacement v will occur along the slit. The mean value of the transverse displacement $[\bar{v}]_\ell$ defined by:

$$[\bar{v}]_\ell = \frac{1}{\ell}\int_{x_1}^{x_2} v\,dx \qquad \text{is related to } \sigma_{y_o} \text{ by:}$$

$$\sigma_{y_o} = K[v]_\ell$$

In the case of a slit in an infinite plate, and using the analogy

between the residual stress in this case and the vortex theory in Hydrodynamics, they have shown that (see references 1 and 2):



$$K = \frac{\pi}{2}\frac{E}{L}\frac{\ell}{L}\frac{1}{F} \tag{3}$$

with

$$F = \sum_{n=1}^{\alpha} \left[\int_{\Theta_1}^{\Theta_2} \sin\Theta \sin n\Theta d\Theta \right]^2$$

where

$$\ell = x_2 - x_1, \; x_2 > x_1$$

$$\Theta_1 = \cos^{-1} \left(\frac{x_1}{L/2}\right)$$

$$\Theta_2 = \cos^{-1} \left(\frac{x_2}{L/2}\right)$$

The value of K as a function of $R = \frac{\ell}{L}$ has been computed and the curve $\bar{K} = \frac{K}{E/L} = \frac{\pi}{2} \times \frac{R}{F(R)}$ has been drawn in Figure 2 for the case where the weld is symmetric, that is $x_1 + x_2 = 0$, and $\Theta_2 = \pi - \Theta_1$ the encircled dots on the diagram are the value of $\bar{K} = \frac{K}{E/L}$ found experimentally. We note that K has the dimension of a stress divided by a length and therefore $\bar{K}$ is dimensionless. In the

experiments described in reference 1, the following results have been obtained:

Slit Length L (mm)	Weld Length ℓ (mm)	$\frac{\ell}{L}$	K (Kg/mm^2/mm)	E/L (Kg/mm^2/mm)	$\overline{K}$
513	173	0.337	51.6	41.13	0.905
340	164	0.488	56.4	62.06	0.740
174	174	1.000	76.8	121.26	0.636
523	174	0.330	52.0	40.34	0.915
349	175	0.502	55.2	60.46	0.730
174	174	1.000	76.8	121.26	0.636
510	163	0.320	38.3	41.37	0.930
176	176	1.000	76.0	119.89	0.636
171	171	1.000	78.2	123.39	0.636
340	168	0.494	57.0	62.06	0.735
172	172	1.000	77.8	122.67	0.636
337	172	0.510	55.5	62.61	0.725
165	165	1.000	81.0	127.88	0.636
202	202	1.000	66.2	104.46	0.636
224	224	1.000	59.6	94.20	0.636
129	129	1.000	103.5	163.57	0.636
96	96	1.000	139.1	219.79	0.636
390	149	0.382	45.6	54.10	0.840
290	150	0.518	52.2	72.76	0.720

In their report, Kihara and Masubuchi did not mention whether the welds are symmetric or not in the case of $x<1.00$. But it has been confirmed by Masubuchi that the welds are made symmetrically. The length of the plate is $L_0 = 1200$ mm, its width is $B = 800$ mm, its thickness is $h = 19$ mm. The slit detail is shown in the accompanying figure.

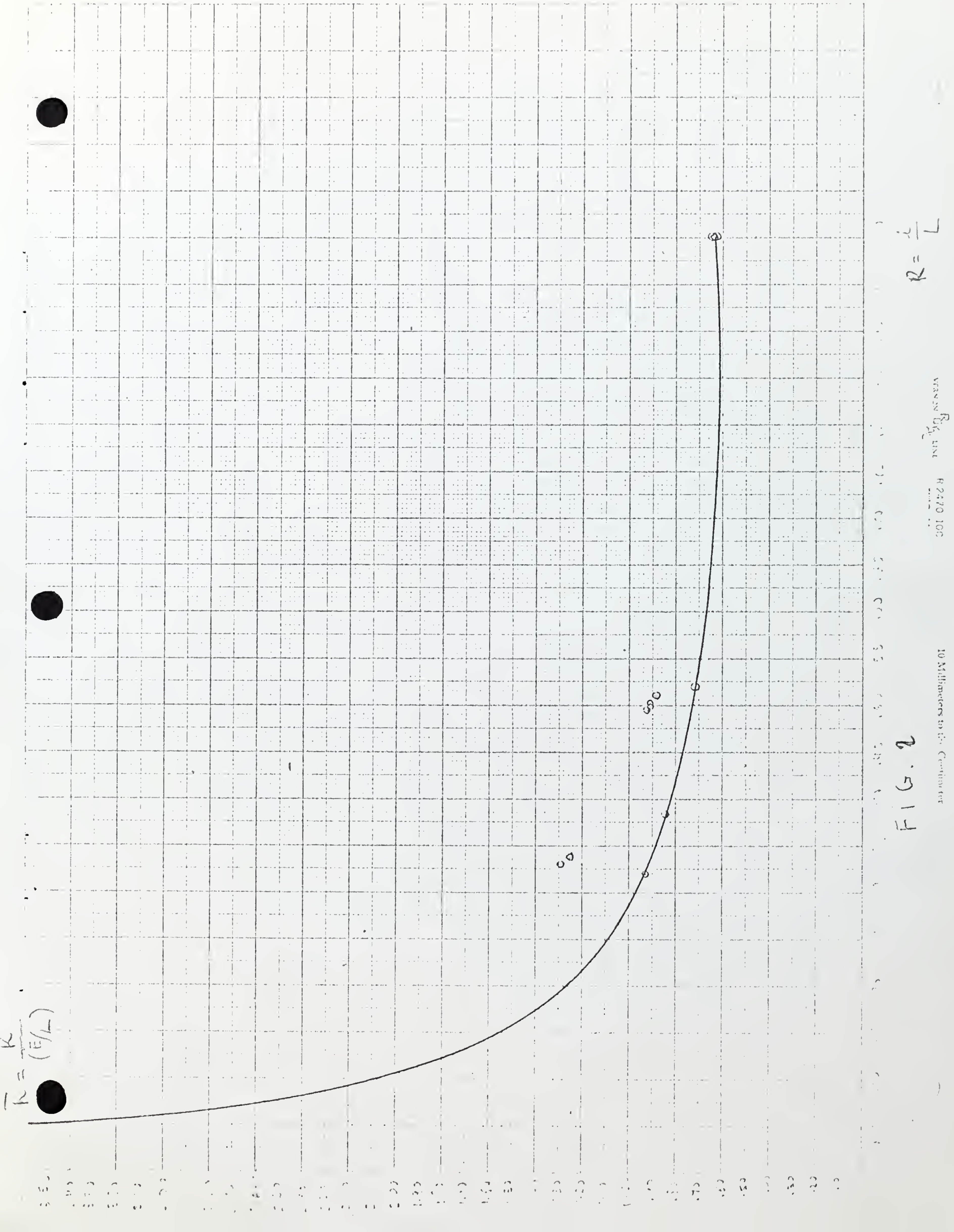


FIG. 2

The experimental values of $\overline{K}$ are higher than those given by the theory, instead of the contrary, since the plates are actually finite and the shrinkages are expected to be larger consequently. There are several reasons for this. One is that the weld cannot be perfectly symmetrical, while the values of K and $\overline{K}$ are lowest in the symmetric case. Another is that the methods of measuring the shrinkages as used by the authors give a lower value than they are actually, since the width of the slit is about 12.8 mm, while the shrinkages are measured along parallel lines which are 45 mm. apart and the value of the shrinkage at that distance of the weld ($\frac{45\text{mm} - 12.8\text{mm}}{2} = 6.1\text{mm}$) is expected to be smaller than they are at the weld.

Using this degree of constraint thus defined, Masubuchi has found a correlation between the mean shrinkage and K in a slit type specimen as reproduced in Figure 3.

Expanding this idea, Watanabe and Satoh (reference 3) later determined the value of K for other configurations such as the H-type and the circular-ring type. Then they found an empirical correlation between the transverse shrinkage S_t and the degree of constraint K for various types of weld in the form:

$$\frac{S_t}{S_{tf}} = \frac{1}{1+0.086K^{0.87}} = F_c$$

S_{tf} being the transverse shrinkage of a free joint which has been defined in the previous part. And they conclude (reference 3) that, "It may be said...that these data are approximately represented by one curve despite the fact that various conditions are different from one to the other. It can be concluded, therefore, that the function F_c $(= \frac{S_t}{S_{tf}})$...or the ratio of shrinkage distortion under external restraint to the one in unrestrained welded joint is decided by K and it is independent of the other conditions." The graph of $\frac{S_t}{S_{tf}} = f(K)$ has been reproduced in Figure 4 with some experimental data for comparison. The value of S_{tf} in the case of butt weld is:

$$S_{tf} = C_1 \frac{A}{h^2} \operatorname{Log}_e \frac{W}{W_o} + C_2 \left(\frac{A}{h^2}\right)^{1/2}$$

A: sectional area of groove of butt joint

h: plate thickness

W: weight of deposited metal per unit length

W_o: weight of deposited metal per unit length per welding of each pass.

In the C.G.S. unit system and with the Ilmenite type, the coefficients C_1 and C_2 have the following values:

Welding Current (A)	Welding Speed (cm/sec)	Size of Electrode (diameter in cm)	C_1	C_2
120	0.3	3.2	0.0960	0.0416
150	0.3	4	0.1021	0.0584
210	0.3	5	0.1530	0.0745
260	0.3	6	0.1249	0.0690

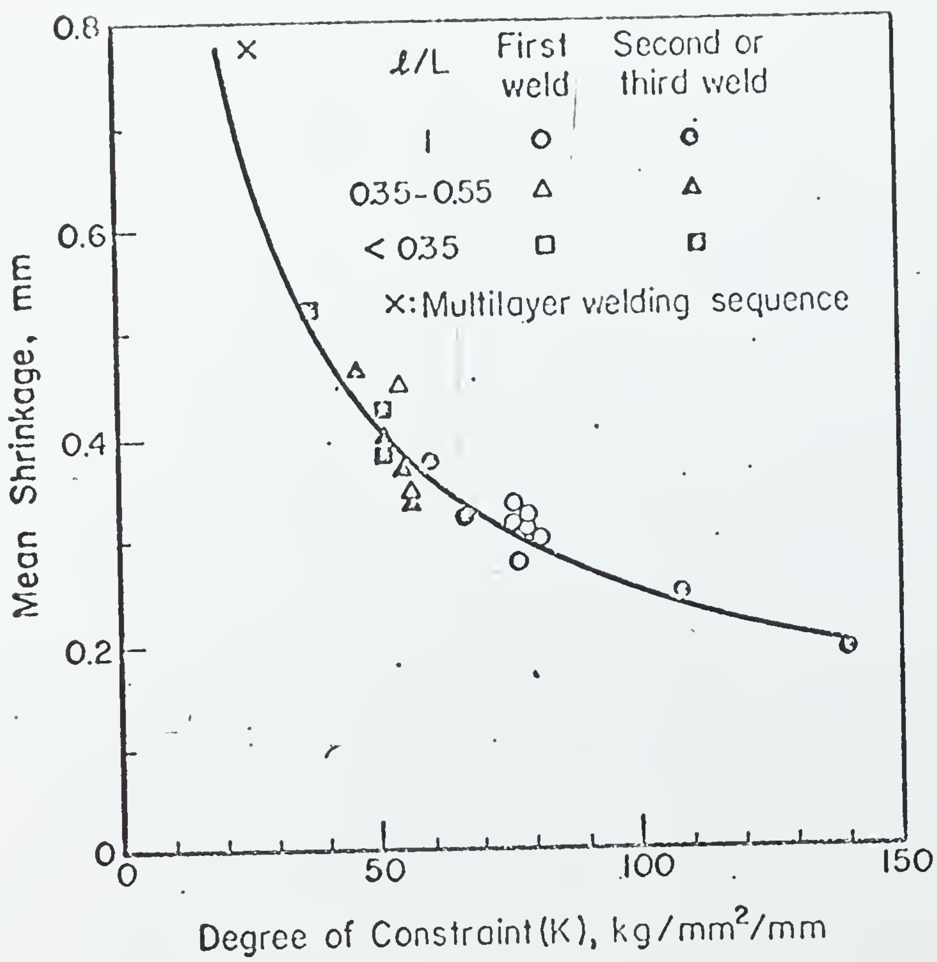


FIGURE 3. RELATIONSHIP BETWEEN DEGREE OF CONSTRAINT AND TRANSVERSE SHRINKAGE IN A SLIT-TYPE SPECIMEN

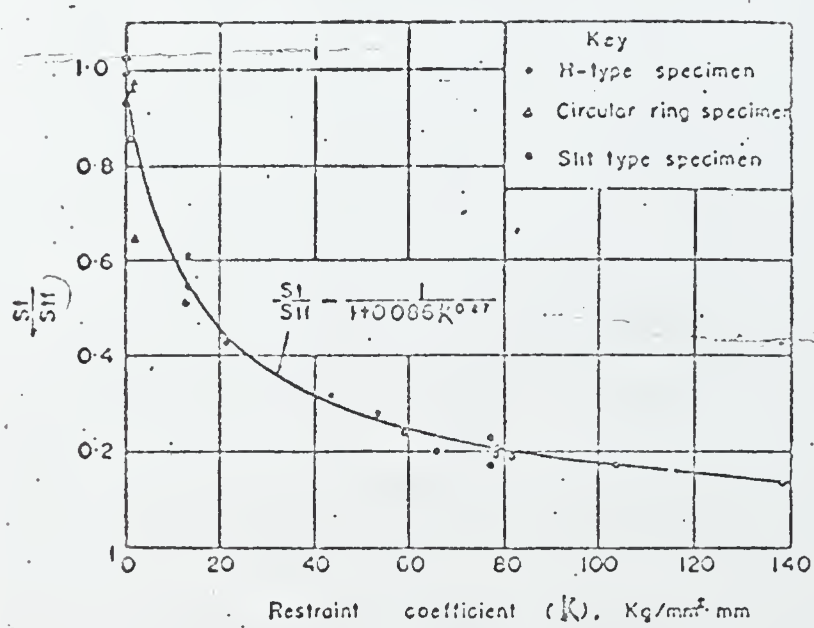
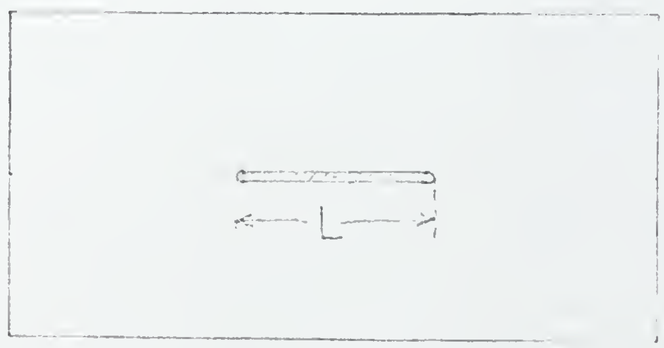


FIGURE 4. Effect of External Constraint on the Transverse Shrinkage of Butt-Welded Joints

III Purpose of the Study

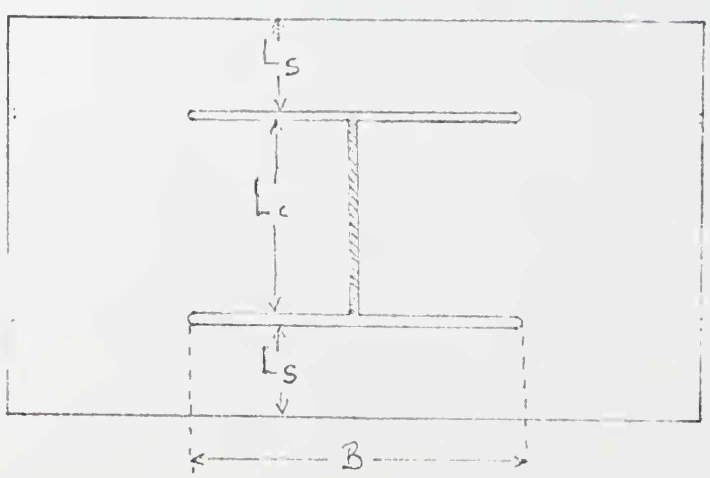
The correlation obtained by Watanabe and Satoh presented in the previous text enables the prediction of the transverse shrinkage and the level of transverse residual stress of a plate due to given welding conditions if the degree of constraint of the weld is known, provided that this empirical correlation is correct. The Watanabe-Satoh correlation has been obtained from a set of experimental data conducted on three types of joints: the straight slit type, the H-slit type and the circular ring type specimen. Some values of K given by Watanabe and Satoh are:



$$K = \frac{2}{\Pi}\frac{E}{L}$$

(for an infinite plate)

Straight-Slit Type



$$K = \frac{E}{B}\,\frac{1}{1+\left(\frac{L_c}{2L_s}\right)}$$

(No information was given as to the width of the H branches, the length of the plate)

H-Slit Type

$$K = \frac{E}{4\Pi} \frac{1}{b-a} \left[\log_e \frac{b}{a} - \frac{b^2-a^2}{b^2+a^2}\right]$$

Circular Ring

The straight slit formula has been found by Masubuchi in reference (1) or (2). The circular ring formula can be found by using the elastic theory (Reference: Theory of Elasticity, by Timoshenko, 2nd edition, problem No. 4, page 126). The H-slit formula can be found by using the elastic theory, according to Watanabe and Satoh.

In these three cases, the geometrical boundaries are relatively simple and analytical formulae are possible. Unfortunately, with the probable exception of the ring type, these specimens are not easy to make. Usually to make a slit, it would be easier to begin by drilling two relatively large circular holes at the ends and then cutting the plate along a line joining their centers.

Also, the dimensions of the plate are finite. Then the region is not single-connected any more and analytical formulation becomes very difficult if not impossible, and numerical methods should be used. The same remark can be applied to actual structures.

The purpose of this study is to compute the value of the degree of constraint K for some types of specimens, to propose a method of experimentation which, when performed, will provide a means of verifying the numerical method used in the computation of K.

This numerical method of computing K provides also a method of quantitatively evaluating the cracking susceptibility of a weld. In this case, some experimentation methods have been proposed (see reference 4, page 32-39), such as the Lehigh test, in which the values of K are measured for different specimens. If the value of K is too high the plate will crack and there should be a critical value K_c, or a range of values, of the degree of constraint K for which:

K below the critical range, the plate will not crack, and
K above the critical range, the plate will crack.

The critical range of K is determined experimentally and could be considered as a material and weld type property. Then if a weld is to be made for a given plate material, its ability to crack can be predicted by computing the value of K of the weld to be made and thus its feasibility can be decided quantitatively before the weld is actually made.

PROCEDURE

I Mathematical Approach

In most cases, a numerical method will be used which is based on the finite element method of structural analysis developed recently and a summary of which can be found in reference (5). The computer programs for the finite element methods in structure analysis are made available by the Civil Engineering Department of M.I.T., whose user's instructions can be found in reference (7).

The basis of the method is to divide the structure into a finite number of small elements. Within each element, the displacements u and v at each point (x,y) in the x- and y-direction are assumed to be series functions of x and y of the form:

$$u(x,y) = \sum_i \sum_j a_{ij} \, x^i \, y^j$$

$$v(x,y) = \sum_i \sum_j b_{ij} \, x^i \, y^j$$

a_{ij} and b_{ij} are functions of the coordinates (x_K, y_K) of the nodes M_K limiting the elements. The functions u(x,y) and v(x,y) are such that displacement compatibility is satisfied along the boundaries of the elements to ensure the condition of convergence to the true solution. By the use of the variational method, a system of linear equations between forces and displacements can be derived

and can be solved for forces if displacements are given or vice versa.

The computer programs set up by the Civil Engineering Department for plates are of four types:

(1) "CSTG": constant strain triangle, global formulation in which the elements are triangles, the strain within each element is assumed to be constant and one global referential system is used for the whole plate.

(2) "CSTL": constant strain triangle, local formulation. The only difference with the "CSTG" is that each element has its own individual referential system.

(3) "LST": linear strain triangle. The elements are triangles, the strain within each element is assumed to vary linearly.

(4) "PSR": plane stress or plane strain rectangle. The elements are rectangles.

The finite element methods provide a powerful means of analysis of structure. Any complicated structure can be investigated without much difficulty. They have, however, their own weaknesses. The input data need to be carefully set up. The results are obtained in the form of numerical answers to the problem and the influence of different factors are not evidenced. Therefore, where it is possible, analytical approach will be used.

II Choice of Appropriate Numerical Method

There are two alternatives in the use of the previously-

mentioned computer programs, namely the constant strain element; "CSTG", "CSTL", "PSR" or the linear strain element "LST."

Therefore the computation of the degree of constraint in the case of a straight slit in a rectangular plate has been made first, using both the constant strain element and the linear strain element programs as means of verifying the adequacy of the methods themselves and a comparison between the two program types since analytical results are available (equation[3], for an infinite plate). Also in the case of constant strain, two types of gridwork are used: one relatively coarse, made of a combination of triangles and rectangles, "CSTG" and "PSR" types, with 105 nodes. The other is made with a finer gridwork, of triangles, "CSTG" type, with 170 nodes. The results are presented in Tables 1 to 6, the loading being symmetrical with respect to the center of the slit. The input and output data are presented in Appendices 1a and 1b for constant strain and in Appendix 2 for linear strain. The symbols used are:

$$R = \frac{\ell}{L}$$

ℓ: loading length

L: length of the slit

v: local transverse displacement (in the direction perpendicular to the slit)

$[\bar{v}]_\ell$: average transverse displacement over the loading length ℓ

K : degree of constraint computed

$$K = \frac{\sigma_{Y_\circ}}{[\bar{v}]_\ell}$$

$\overline{K}$: non-dimensionalized degree of constraint computed:

$$\overline{K} = \frac{K_c}{E/L}$$

E: Young Modulus of Elasticity
L: Length of the slit

$\overline{K}_\infty$: non-dimensionalized degree of constraint obtained analytically in the case of an infinite plate:

$$\overline{K} = \frac{K_\infty}{E/L}$$

The use of non-dimensionalized $\overline{K}$ ($\overline{K}_c$ or $\overline{K}_\infty$) makes the results somehow comparable in the form of curves relating $\overline{K}$ or $\overline{K}_\infty$ to R and are presented in Figure 5. The difference between $\overline{K}_\infty$ and $\overline{K}$ could not be considered as a measure of the accuracy of the numerical method because $\overline{K}_\infty$ is the non-dimensionalized degree of constraint in an infinite plate and for which the only significant dimension is the slit length L of the weld and $\overline{K}$ is the non-dimensionalized degree of constraint in a finite plate and for which the significant dimensions include the slit length L, the plate length L_o and the plate width W_o. But we can expect $\overline{K}$ to be smaller than $\overline{K}_\infty$ since the restraint due to a finite plate should be less than that due to an infinite plate.

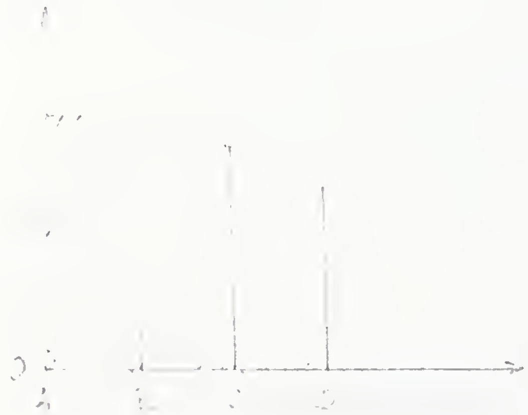
The average transverse displacement $[\overline{v}]_\ell$ is defined as:

$$[\overline{v}]_\ell = \frac{1}{\ell} \int_{-\ell/2}^{\ell/2} v dx$$

for a symmetric weld, where ℓ is the weld length.

In order to determine $[\overline{v}]_\ell$, the local values of v at various nodes where loads are applied, are plotted as a function of

the abscisse x of the nodes. Then a curve (C) is faired in through these points and the area limited by the axis 0y (which is also the axis of symmetry), the ordinate $x = \ell/2$, the curve (C) and the axis 0x is measured graphically by a planimeter.



$$\text{Area} = \int_0^{x_D} v\,dx$$

A,B,C,D are loaded nodes

$$x_D = \frac{\ell}{2}$$

By dividing the value of this area to $\ell/2$, the average half transverse displacement $\overline{v}/2$ is obtained, since the weld is also symmetrical with respect to 0x and the transverse displacement is the distance which both sides of the weld come in to each other.

From the results in Figure 5 these conclusions could be formulated:

(1) The linear type gives an unusual swing: the curve of $\overline{K}$ is above that of $\overline{K}_\infty$ for small R and becomes smaller than that of $\overline{K}$ computed by the "CSTG" method for large values of R.

(2) The constant strain types "CSTG", "PSR" in the two gridworks give more consistent results. The $\overline{K}$ curve obtained is almost parallel to the $\overline{K}_\infty$ curve. Also, there is not much difference between the two gridworks,

one coarse and the other fine.

Therefore, the constant strain element type with a relatively coarse gridwork can be used in the computation of the degree of constraint of various joint configurations in plate structure.

III Units Used

1) Length:

(a) inch

(b) millimeter wherever comparison with Japanese data is desirable.

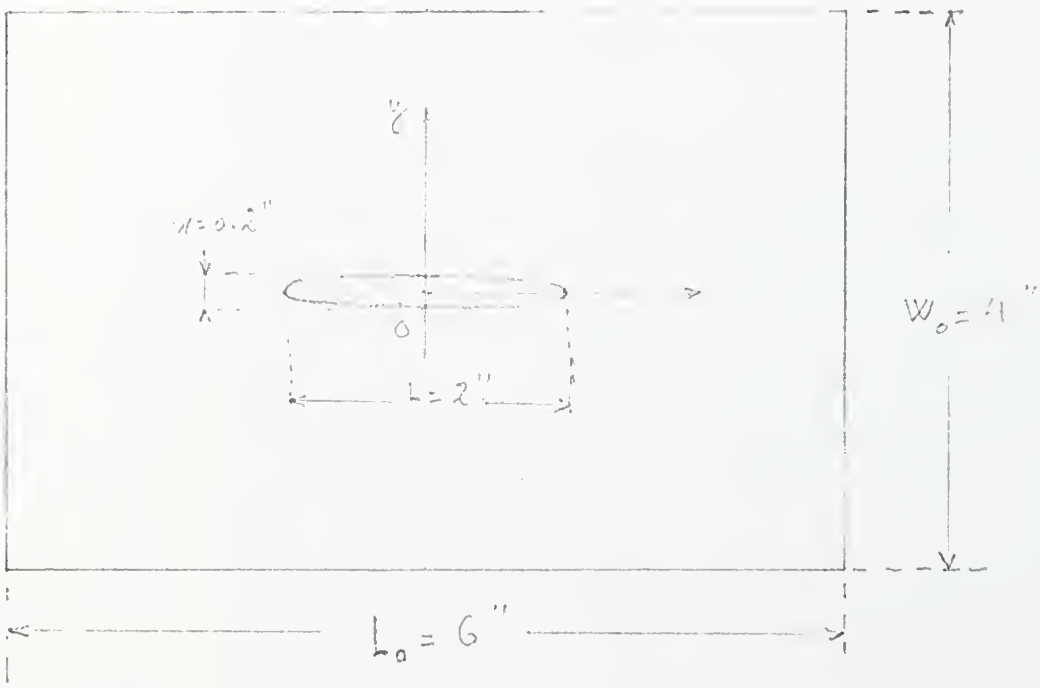
2) Force:

(a) Pound

(b) Kilogram wherever comparison with Japanese data is desirable.

ELLIPTIC HOLE

Dimension Characteristics:



Length of Plate, L_o=6"

Width of Plate, W_o=4"

Plate Thickness, T=0.2"

Length of Slit, L=2"

Maximum Width of Slit, W=0.2"

$\frac{\text{Large Axis a}}{\text{Small Axis b}} = 10$

Mechanical Characteristics:

Force Applied = 2×10^5 lb/in

$\sigma_{Y_o} = 10^6$ psi

Young's Modulus, E = 30×10^6 psi

$\frac{E}{L} = 15 \times 10^6$ psi/in

TABLE 1

Node Displacements in the Y-Direction (in 10^{-2} inches), Constant Strain Elements

	Node Names											Average half transverse displacement $\frac{\overline{V}}{2}(10^{-2}in)$	$R=\frac{\ell}{L}$
	1	9	11	18	20	27	29	36	38	45	47		
Node Abscisse (inches)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
	1.902	1.626										1.797	0.1
	3.318	3.140	2.722									3.125	0.2
	4.493	4.355	4.070	3.527								4.192	0.3
	5.491	5.378	5.160	4.763	4.104							5.039	0.4
	6.348	6.251	6.071	5.730	5.221	4.442						5.781	0.5
	7.079	6.991	6.829	6.519	6.084	5.451	4.542					6.315	0.6
	7.687	7.604	7.452	7.161	6.766	6.187	5.424	4.353				6.730	0.7
	8.166	8.066	7.939	7.657	7.281	6.729	6.030	5.091	3.774			6.904	0.8
	8.503	8.424	8.279	8.001	7.634	7.096	6.427	5.530	4.336	2.753		6.866	0.9

TABLE 2

Values of the Degree of Constraint K and the Non-Dimensionalized Degree of Constraint $\overline{K} = \frac{K}{(E/L)}$ for Different Values of $R = \frac{\ell}{L}$ (Constant Strain Element)

$R = \frac{\ell}{L}$	$\overline{v}/2$ (10^{-2} in)	K (10^{6} psi/in)	$\overline{K}$	$\overline{K}_{\infty}$
0.1	1.797	27.824	1.855	2.079
0.2	3.125	16.000	1.067	1.268
0.3	4.192	11.927	0.795	0.975
0.4	5.039	9.923	0.662	0.823
0.5	5.781	8.649	0.577	0.731
0.6	6.315	7.918	0.528	0.673
0.7	6.730	7.429	0.495	0.637
0.8	6.904	7.242	0.483	0.617
0.9	6.866	7.282	0.485	0.614

TABLE 3

Node Displacements in the Y-Direction (in 10^{-2} inches)
Constant Strain Elements - Finer Gridwork -

	Node Names											Average Half Displacement $\overline{v}/2$ (10^{-2} in)	$R=\frac{\ell}{L}$
	1	16	21	29	34	43	48	56	61	70	75		
Node Abscisse (inches)	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0		
	1.852	1.625										1.725	0.1
	3.263	3.120	2.691									3.098	0.2
	4.426	4.326	4.029	3.489								4.157	0.3
	5.421	5.344	5.096	4.698	4.047							5.000	0.4
	6.273	6.208	5.988	5.658	5.152	4.388						5.725	0.5
	6.999	6.941	6.738	6.446	5.993	5.377	4.481					6.222	0.6
	7.602	7.547	7.355	7.082	6.656	6.106	5.349	4.293				6.577	0.7
	8.080	8.027	7.840	7.577	7.168	6.650	5.942	5.024	3.782			6.804	0.8
	8.415	8.364	8.179	7.921	7.520	7.017	6.327	5.460	4.338	2.679		6.780	0.9

TABLE 4

Values of the Degree of Constraint K and the Non-Dimensionalized Degree of Constraint $\overline{K} = \frac{K}{(E/L)}$ for Different Values of $R = \frac{\ell}{L}$ (Constant Strain Elements - Finer Gridwork)

$R = \frac{\ell}{L}$	$\overline{v}/2$ (10^{-2} in)	K (10^6 psi/in)	$\overline{K}$	$\overline{K}_\infty$
0.1	1.725	28.986	1.932	2.079
0.2	3.098	16.139	1.075	1.268
0.3	4.157	12.028	0.802	0.975
0.4	5.000	10.000	0.667	0.823
0.5	5.725	8.734	0.582	0.731
0.6	6.222	8.035	0.536	0.673
0.7	6.577	7.602	0.507	0.637
0.8	6.804	7.349	0.490	0.617
0.9	6.780	7.375	0.492	0.614

TABLE 5

Node Displacements in the Y-Direction (10^{-2} inches) - Linear Strain Elements

	Node Names														
	1	113	9	129	11	138	18	153	20	162	27	177	29	186	36
Node Abscisse (inches)	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70
	2.565	2.670	2.705	2.459	2.138										
	4.895	5.020	5.115	5.009	4.971	4.759	4.598	4.203	3.742						
	6.664	6.772	6.877	6.789	6.779	6.617	6.537	6.295	6.130	5.795	5.513	4.999	4.410		
	7.904	8.033	8.141	8.059	8.056	7.905	7.840	7.619	7.483	7.198	6.994	6.629	6.333	5.855	5.417

186	36	201	38	210	45	225	47	Average Half Displacement $\overline{v}/2$ (10^{-2} in)	$R = \frac{\ell}{L}$
0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00		
								2.617	0.2
								4.805	0.4
								6.302	0.6
5.855	5.417	4.736	3.949					7.051	0.8

TABLE 6

Values of the Degree of Constraint K and the Non-Dimensionalized Degree of Constraint $\overline{K} = \frac{K}{(E/L)}$ for Different Values of $R = \frac{\ell}{L}$

(Linear Strain Elements)

$R = \frac{\ell}{L}$	$\overline{v}/2$ (10^{-2} in)	K (10^{6} psi/in)	$\overline{K}$	$\overline{K}_\infty$
0.2	2.617	19.106	1.274	1.268
0.4	4.805	10.406	0.694	0.823
0.6	6.302	7.934	0.529	0.673
0.8	7.051	7.091	0.473	0.617

Elliptic hole

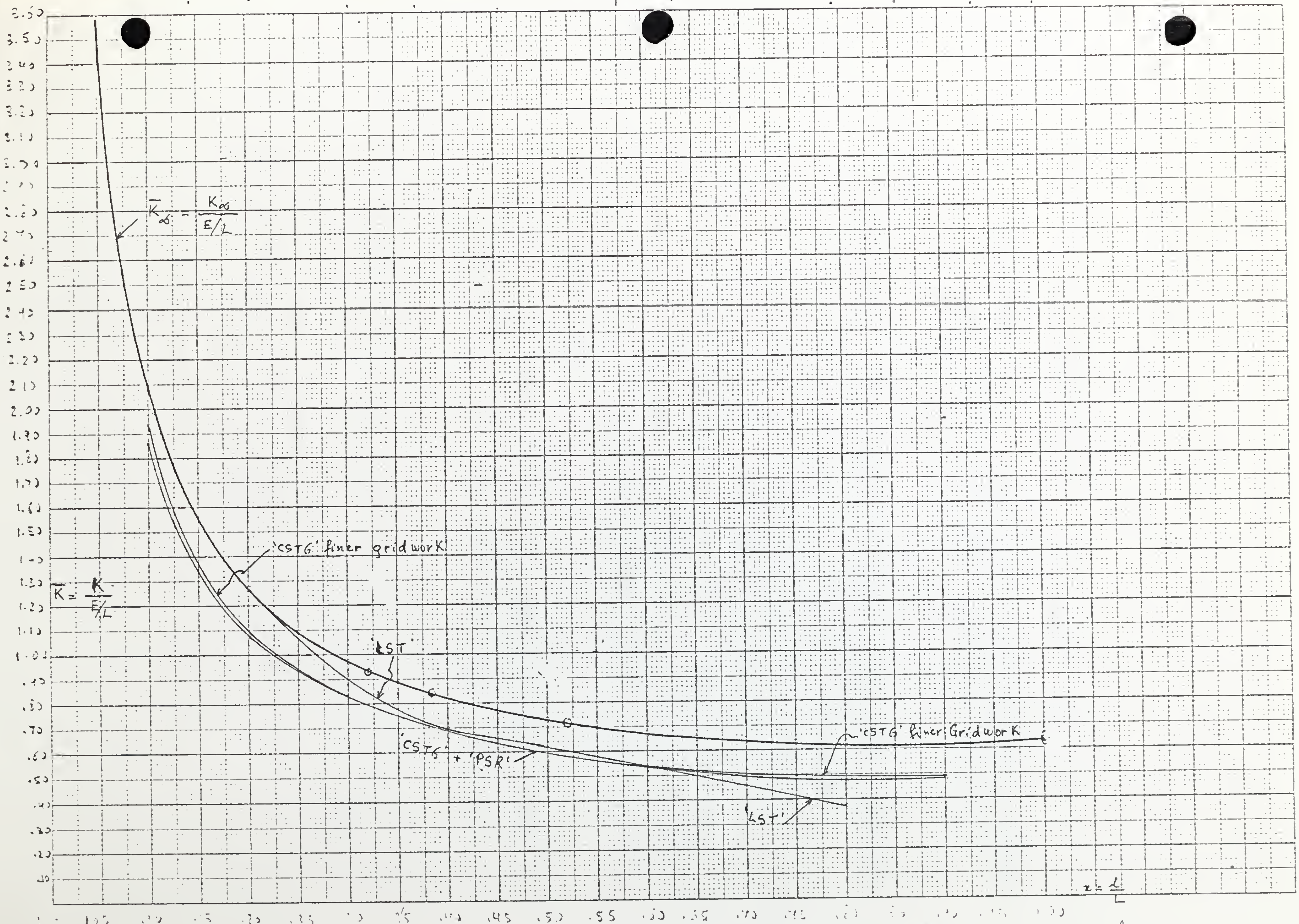


Fig. 5 Value of Non Dimensionalized Degree of Constraint $\bar{K}$ vs $x = \frac{l}{L}$

RESULTS

I Presentation of the Results

A. Straight Slit Type - The results are assembled in tables 7 and 8 and in Figure 6; the input and output data are in Appendix 3.

B. Straight Slit with Circular Holes at the Ends - The results are in Tables 9 and 10 for the "CSTG" type and in Tables 11 and 12 for the "LST" type and are assembled in Figure 7 for both types. The input and output data are in Appendices 4 for "CSTG" and 5 for "LST." Here again the two methods, "CSTG" and "LST" are used in order to compare them again because the weld configuration is different from the previous cases.

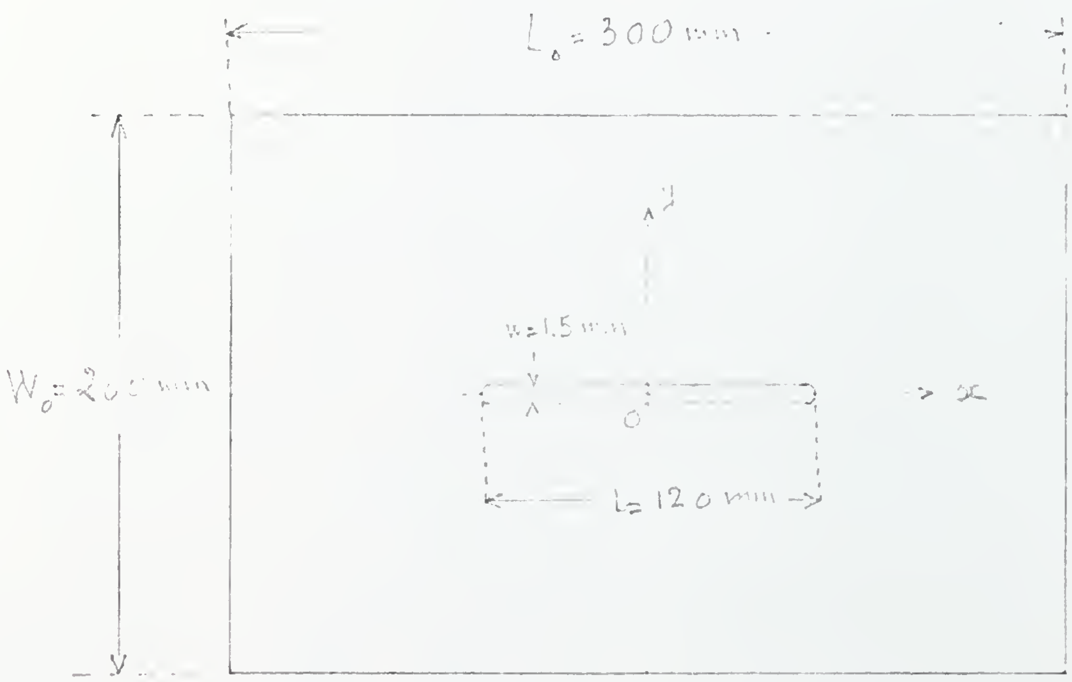
C. H-Slit Type, Steel Plate - The results are in Tables 13 and 14 and in Figure 8. The input and output data are in Appendix 6.

D. Lehigh Test Specimen - The results are in Tables 15 and 16. The input and output data are in Appendices 7a and 7b.

E. H-Slit Type, Aluminum Plate - The results are in Table 17. The input and output data are in Appendix 8.

STRAIGHT SLIT HOLE

Dimension Characteristics:



Length of Plate, L_o=300 mm

Width of Plate, W_o=200 mm

Plate Thickness = 5 mm

Length of Slit, L=120 mm

Width of Slit, W=1.5 mm

Mechanical Characteristics:

Force Applied = 5000 Kg/mm

$$\sigma_{Y_o} = 1000 \text{ Kg/mm}^2$$

Young's Modulus E = 21,100 Kg/mm^2

$$\frac{E}{L} = \frac{21,100}{120} = 175.8 \text{ Kg/mm}^2\text{-mm}$$

TABLE 7

Node Displacements in the Y-Direction (Millimeters)

	Node Names													Average Half Displacement	
	1	8	13	15	18	20	26	28	31	33	39	41	44		
Node Abscisse (mm)	0.	5.	10.	15.	20.	25.	30.	35.	40.	45.	50.	55.	60.	$\frac{\overline{V}}{2}$ (mm)	$R=\frac{\ell}{L}$
	4.222	4.165	4.012	3.759	3.320									3.926	1/3
	5.600	5.549	5.420	5.223	4.951	4.590	4.041							5.091	1/2
	6.691	6.642	5.524	6.346	6.107	5.800	5.400	4.876	4.144					5.918	2/3
	7.495	7.448	7.333	7.161	6.928	6.628	6.247	5.773	5.197	4.506	3.569			6.305	5/6
	7.943	7.896	7.783	7.611	7.379	7.080	6.703	6.239	5.686	5.037	4.225	3.134	1.375	6.133	1

TABLE 8

Values of the Degree of Constraint K and the Non-Dimensionalized Degree of Constraint $\overline{K} = \frac{K}{(E/L)}$ for Different Values of $R = \frac{\ell}{L}$

$R = \frac{\ell}{L}$	$\overline{v}/2$ (mm)	K (Kg/mm^2-mm)	$\overline{K}$	$\overline{K}_\infty$
1/3	3.926	127.36	0.724	0.943
1/2	5.091	98.21	0.559	0.731
2/3	5.918	84.49	0.481	0.649
5/6	6.305	79.30	0.451	0.615
1	6.133	81.53	0.464	0.637

Straight Slit

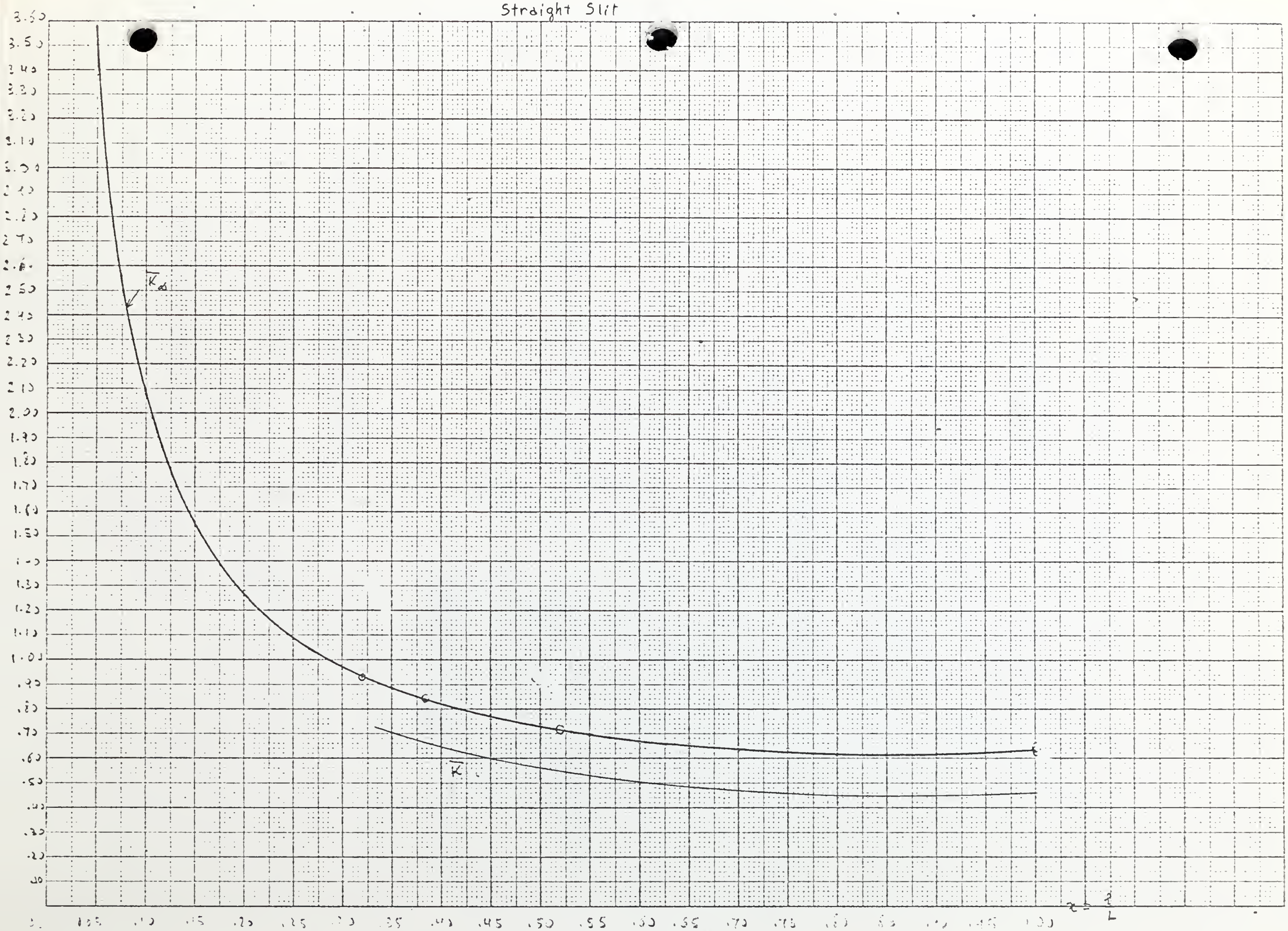
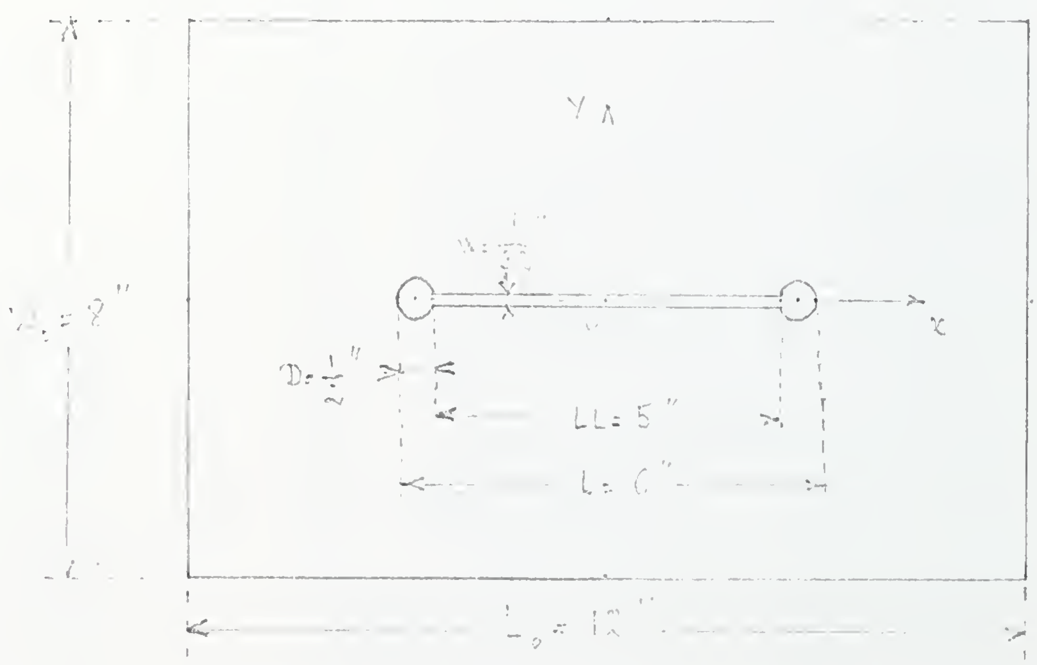


Fig. 6 Degree of Constraint $\overline{K}$ vs weld length $x = \frac{l}{L}$

STRAIGHT SLIT, CIRCLED ENDS

Dimension Characteristics:



Length of Plate, L_o=12"	Slit Overall Length, L=6"
Width of Plate, W_o=8"	Loading Length, LL=5"
Plate Thickness, T=0.1"	End Circle Diameter, D=0.5"
	Width of Slit Along Loading Length, $W=\frac{1}{32}$"

Mechanical Characteristics:

$$\text{Force Applied} = 8 \times 10^3 \text{ lb/in}$$

$$\sigma_{y_o} = 8 \times 10^4 \text{ psi}$$

$$\text{Young's Modulus } E = 30 \times 10^6 \text{ psi}$$

$$\frac{E}{LL} = 6 \times 10^6 \text{ psi/in}$$

TABLE 9

Node Displacements in the Y-Direction (10^{-2} in)
Constant Strain Elements

	Node Names											Average Half Displacement $\overline{V}/2$ (10^{-2} in)	$R=\frac{\ell}{LL}$
	1	9	16	24	26	32	39	47	49	55	62		
Node Abscisse (inches)	0.0	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.503		
	0.868	0.831	0.750									0.820	0.2
	1.510	1.483	1.431	1.348	1.210							1.414	0.4
	2.030	2.005	1.959	1.887	1.785	1.653	1.466					1.840	0.6
	2.441	2.417	2.372	2.302	2.209	2.088	1.934	1.745	1.491			2.132	0.8
	2.742	2.717	2.672	2.602	2.509	2.389	2.239	2.059	1.838	1.585	1.282	2.261	1.0

TABLE 10

Values of the Degree of Constraint K, the Non-Dimensionalized Degree of Constraint $\overline{K} = \frac{K}{E/L}$ and the Specific Degree of Constraint $K' = \frac{K}{E}$ for Different Values of $R = \frac{\ell}{L}$

(Constant Strain Elements)

$R = \frac{\ell}{L}$	$\overline{v}/2$ (10^{-2} in)	K (10^{6} psi/in)	$\overline{K}$	$\overline{K}$	K' (in^{-1})
0.2	0.820	4.878	0.813	1.268	0.163
0.4	1.414	2.829	0.472	0.823	0.0943
0.6	1.840	2.174	0.362	0.673	0.07247
0.8	2.132	1.876	0.313	0.617	0.0625
1.0	2.261	1.769	0.295	0.636	0.0590

Table 11

Node Displacements in the Y-Direction (

	Node Names									
	1	147	9	164	16	178	24	193	26	201
Node Abscisse (inches)	0.0	0.125	0.25	0.375	0.50	0.625	0.75	0.875	1.00	1.125
	0.489	0.466	0.457	0.401	0.344					
	0.718	0.697	0.693	0.653	0.631	0.582	0.556	0.502	0.457	
	0.896	0.874	0.869	0.829	0.807	0.766	0.754	0.730	0.738	0.726
	1.051	1.028	1.022	0.980	0.957	0.916	0.909	0.894	0.916	0.923
	1.174	1.151	1.144	1.100	1.076	1.033	1.028	1.017	1.047	1.064

$(10^{-2}$ in), Linear Strain Elements

											Average Half Displacement	$R=\frac{\ell}{L}$
32	216	39	300	47	315	49	323	55	338	62		
1.25	1.375	1.50	1.625	1.75	1.875	2.00	2.125	2.25	2.12502	2.503	$\bar{v}/2$ $(10^{-2}$in)	
											0.445	0.2
											0.620	0.4
0.730	0.690	0.645									0.777	0.6
0.953	0.948	0.954	0.924	0.903	0.836	0.765					0.944	0.8
1.106	1.112	1.131	1.116	1.115	1.076	1.050	0.990	0.941	0.852	0.774	1.070	1.0

TABLE 12

Values of the Degree of Constraint K, the Non-Dimensionalized Degree of Constraint $\bar{K} = \frac{K}{(E/L)}$ and the Specific Degree of Constraint $K' = K/E$ (Linear Strain Elements)

$R = \frac{\ell}{L}$	$\bar{v}/2$ (10^{-2} in)	K (10^{6} psi/in)	$\bar{K}$	$\bar{K}_{\infty}$	K' (in^{-1})
0.2	0.445	8.989	1.498	1.268	0.300
0.4	0.620	6.452	1.075	0.823	0.215
0.6	0.777	5.148	0.858	0.673	0.172
0.8	0.944	4.237	0.706	0.617	0.141
1.0	1.070	3.738	0.623	0.636	0.125

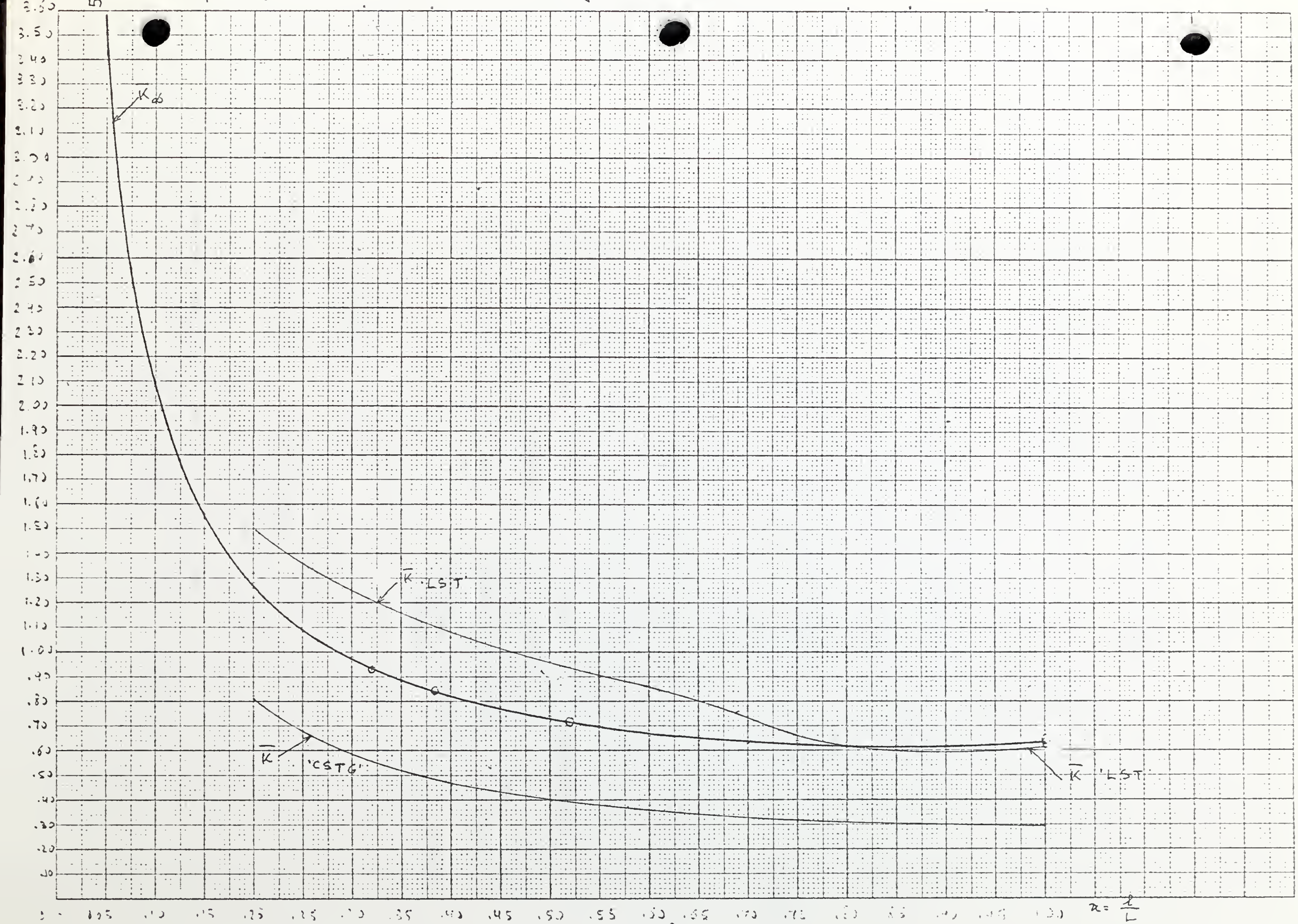
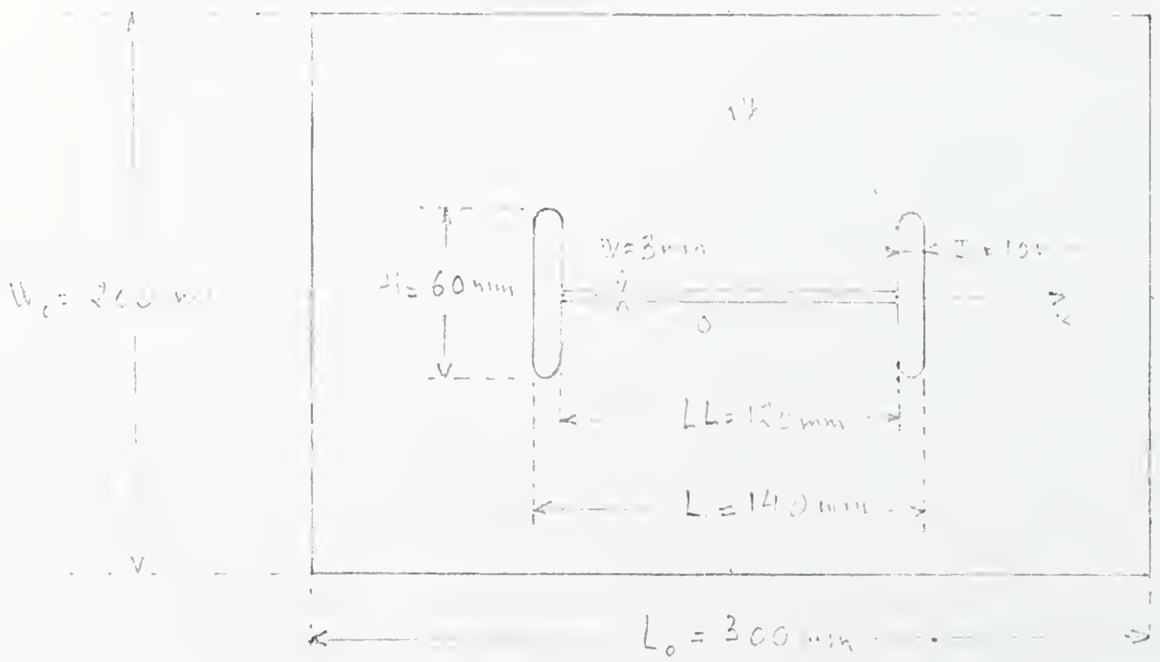


Fig. 7 Degree of constraint $\bar{K}$ vs. weld length $x = \frac{l}{L}$

10 Millimeters to the Centimeter R 2470-10C VERNON LINE

H-SLIT HOLE - STEEL PLATE

Dimension Characteristics:



Length of Plate, L_o=300 mm	Slit Overall Length, L=140 mm
Width of Plate, W_o=200 mm	Loading Length, LL = 120 mm
Plate Thickness, T=5 mm	H-Branch Width, D = 10 mm
	H-Branch Overall Height, H = 60 mm

Mechanical Characteristics:

Force Applied = 50 Kg/mm

$$\sigma_{Y_o} = 10 \text{ Kg/mm}^2$$

Young's Modulus E = 21,100 Kg/mm^2

$$\frac{E}{LL} = \frac{21{,}100}{120} = 175.83 \text{ Kg/mm}^2\text{-mm}$$

TABLE 13

Displacements in the Y-Direction (10^{-2} mm)

	Node Names									Average Half Displacement $\bar{v}/2$ (10^{-2}mm)	$R=\frac{\ell}{LL}$
	20	22	26	28	36	38	42	48	57		
	20	25	30	35	40	45	50	55	60		
…2	5.130									5.762	1/3
…54	7.650	7.287	6.709							7.839	1/2
…72	9.710	9.402	9.207	8.566	7.909					9.551	2/3
…38	11.489	11.208	10.865	10.493	10.033	9.543	8.896			11.03	5/6
…1	13.059	12.792	12.481	12.151	11.781	11.423	11.114	10.825	10.610	12.36	1

TABLE 13

Node Displacements in the Y-Direction (10

	Node Names								
	1	9	13	15	20	22	26	28	36
Node Abscisse (mm)	0	5	10	15	20	25	30	35	40
	6.040	5.996	5.823	5.592	5.130				
	8.316	8.282	8.141	7.954	7.650	7.287	6.709		
	10.308	10.276	10.146	9.972	9.710	9.402	9.207	8.566	7.909
	12.061	12.030	11.905	11.738	11.489	11.208	10.865	10.493	10.033
	13.616	13.585	13.463	13.301	13.059	12.792	12.481	12.151	11.781

TABLE 14

Values of the Degree of Constraint, the Non-Dimensionalized Degree of Constraint $\overline{K} = \frac{K}{(E/LL)}$ and the Specific Degree of Constraint $K' = K/E$ for Different Values of $R = \ell/LL$

$R = \frac{\ell}{LL}$	$\overline{v}/2$ (10^{-2} mm)	K (Kg/mm^2-mm)	$\overline{K}$	$\overline{K}_\infty$	K' (mm^{-1})
1/3	5.762	86.78	0.493	0.943	4.164×10^{-3}
1/2	7.839	63.78	0.363	0.731	3.023×10^{-3}
2/3	9.551	52.35	0.298	0.649	2.481×10^{-3}
5/6	11.03	45.83	0.258	0.615	2.172×10^{-3}
1	12.36	40.45	0.230	0.637	1.917×10^{-3}

H-Slit

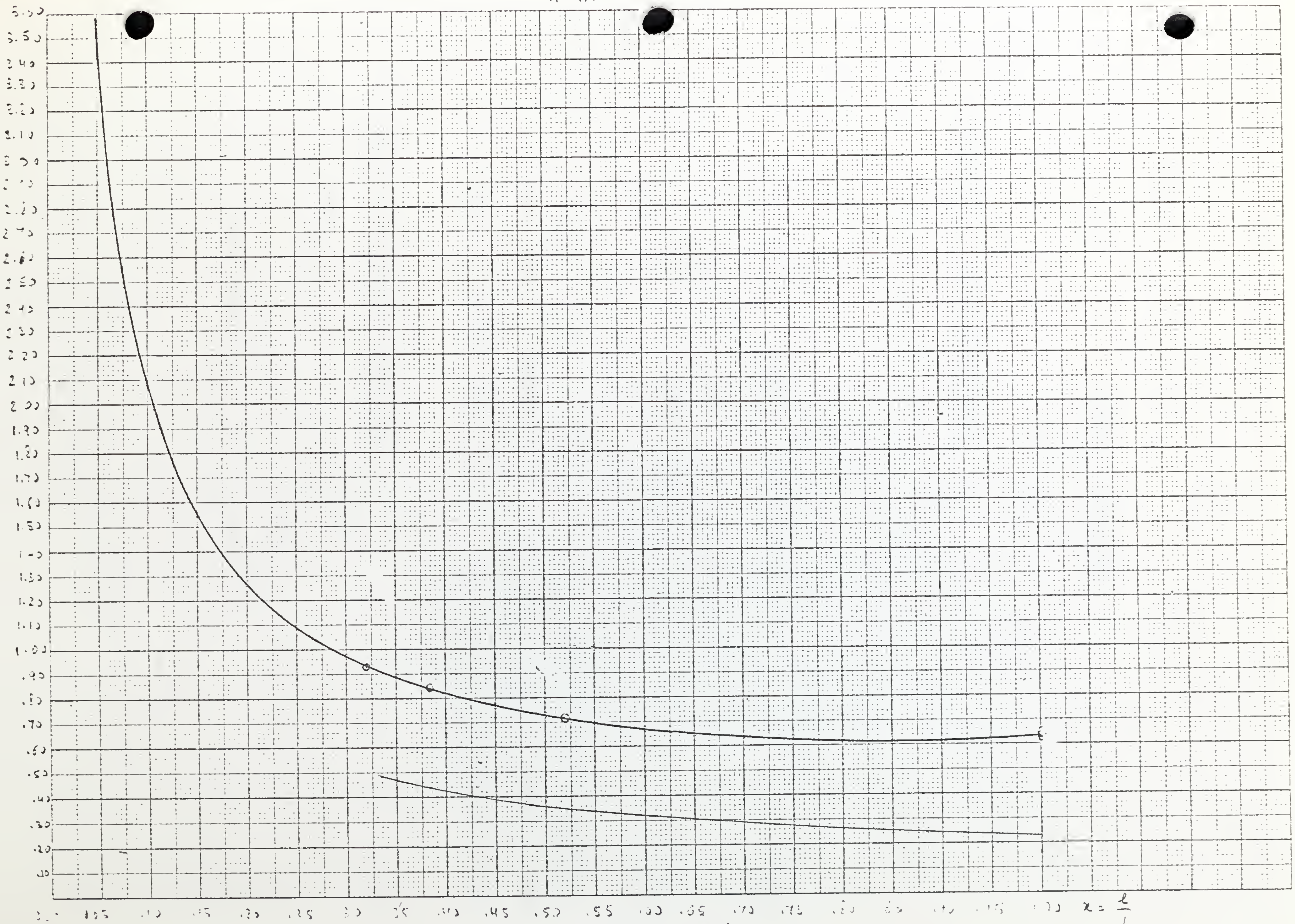
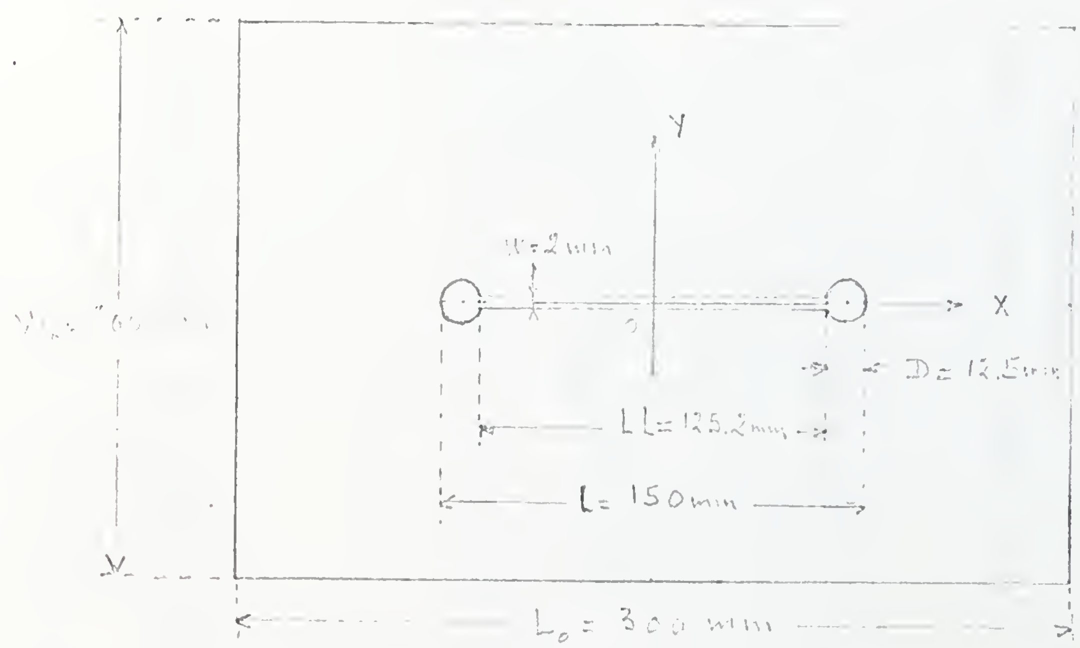


Fig. 8 Degree of Constraint $\bar{K}$ vs. weld length $x = \frac{l}{L}$

LEHIGH SPECIMEN

(No Sawcut)

Dimension Characteristics:



Length of Plate, L_o=300 mm

Width of Plate, W_o=200 mm

Plate Thickness, T=10 mm

Slit Overall Length, L=150mm

Loading Length, LL = 125.2mm

End Circle Diameter, D=12.5mm

Slit Width, W = 2mm

Mechanical Characteristics:

Force Applied $= 10^3$ Kg/mm

$\sigma_{Y_o} = 10^2$ Kg/mm^2

Young's Modulus $E = 21{,}100$ Kg/mm^2

TABLE 15

Results of the Lehigh Specimen Without Sawcut

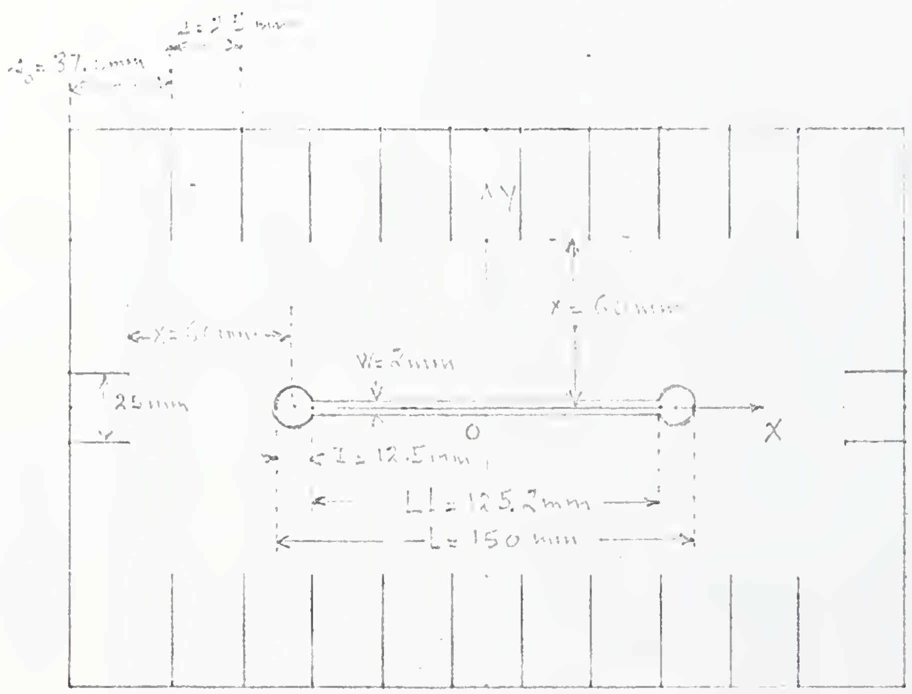
	Node Names								Average Half Displacement $\bar{v}/2$ (mm)	K (Kg/mm^2-m)	K measured* (Kg/mm^2-m)
	1	17	44	52	78	89	103	114			
Node Abscisse (mm)	0	10	20	30	40	50	60	62.6			
Node Displacements (mm)	1.238	1.222	1.176	1.099	0.989	0.840	0.644	0.578	1.038	48.17	44

* $K_{measured}$ is obtained from a Japanese paper given to me by Professor Masabuchi

LEHIGH SPECIMEN

(With Saw Cut)

Dimension Characteristics:



Saw cut width = 1mm

Saw cut spacement, s = 25 mm

Saw cut length determined by x = 60mm

Other characteristics remain unchanged.

TABLE 16

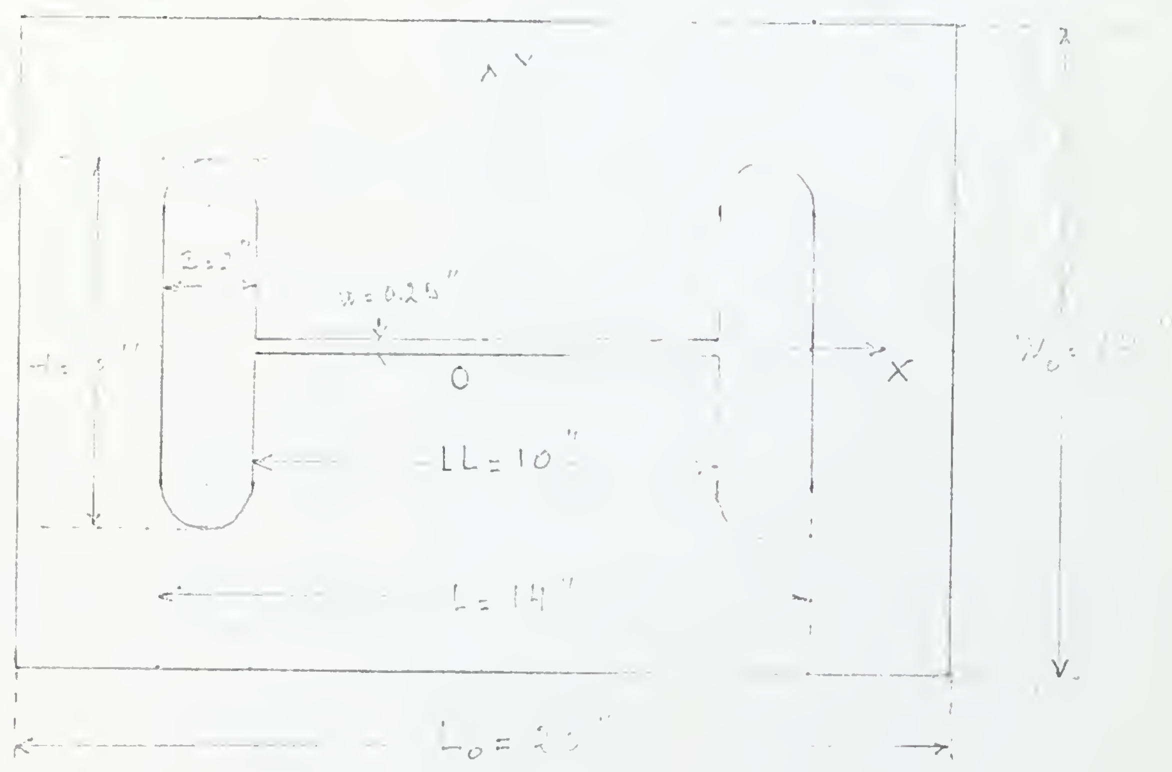
Results of the Lehigh Specimen with Sawcut

	Node Names								Average Half Displacement $\overline{v}/2$ (mm)	K (Kg/mm^2-m)	$K_{measured}$* (Kg/mm^2-m
	1	17	44	52	78	89	103	114			
Node Abscisse (mm)	0	10	20	30	40	50	60	62.6			
Node Displacements (mm)	2.019	1.987	1.894	1.743	1.535	1.270	0.945	0.842	1.629	30.69	27

* $K_{measured}$ is obtained from a Japanese paper given to me by Professor Masabuchi

H-SLIT HOLE, ALUMINUM PLATE

Dimension Characteristics:



Length of Plate, L_o=20"

Width of Plate, W_o =14"

Plate Thickness, T=0.5"

Slit Overall Length, L=14"

Loading Length, LL = 12"

H-Branch Width, D = 2"

H-Branch Overall Height, H=8"

Mechanical Characteristics:

Force Applied $= 5 \times 10^3$ lb/in

$\sigma_{Y_o} = 10^4$ psi

Young's Modulus $E = 10 \times 10^6$ psi

TABLE 17

Result of the H-Slit, Aluminum Plate

	Node Names											
	1	9	13	20	24	32	36	43	47	57	66	81
Node Abscisse (inches)	0.0	0.4	0.8	1.2	1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4
Node Displacement $v/2 (10^{-2}$ in)	7.34	7.33	7.31	7.26	7.21	7.13	7.05	6.97	6.88	6.80	6.72	6.6[illegible]

TABLE 17

Result of the H-Slit, Aluminum Plate

Node Names										Average Half Displacement $\bar{v}/2$ (10^{-2}in)	K (10^{4}psi/in)
24	32	36	43	47	57	66	81	90	102		
1.6	2.0	2.4	2.8	3.2	3.6	4.0	4.4	4.8	5.0		
7.21	7.13	7.05	6.97	6.88	6.80	6.72	6.66	6.61	6.58	7.005	7.14

II. Discussion Of Results

A. Interpretation of the Results

The valid results for different joint configurations are assembled in Figure 9.

As expected, the $\overline{K}$ value for a finite plate is smaller than that for an infinite plate. The effect of finiteness is also evidenced by the difference in the $\overline{K}$ value between the elliptic slit and the straight slit. In the first case, if we refer to page 35 we see that the ratio between the plate length L_o and the slit length L is:

$$\left(\frac{L_o}{L}\right)_{\text{elliptic hole}} = \frac{6}{2} = 3$$

while the same ratio for the straight slit, page 44 is

$$\left(\frac{L_o}{L}\right)_{\text{straight slit}} = \frac{300}{120} \quad \frac{3}{1.2} < 3$$

Both plates have the same aspect ratio $L_o/W_o = 3/2$. It can therefore be concluded that for straight slit weld configuration, (there is not much difference between an ellipse with an axis ratio of $a/b = 10$ and a straight slit), the value of $\overline{K}$ depends on the ratio between plate length L_o and slit length L. $\overline{K}$ is larger for larger ratio L_o/L and for straight slits having the same length, the degree of constraint K is larger for the one with larger L_o/L. This result conforms to common sense.

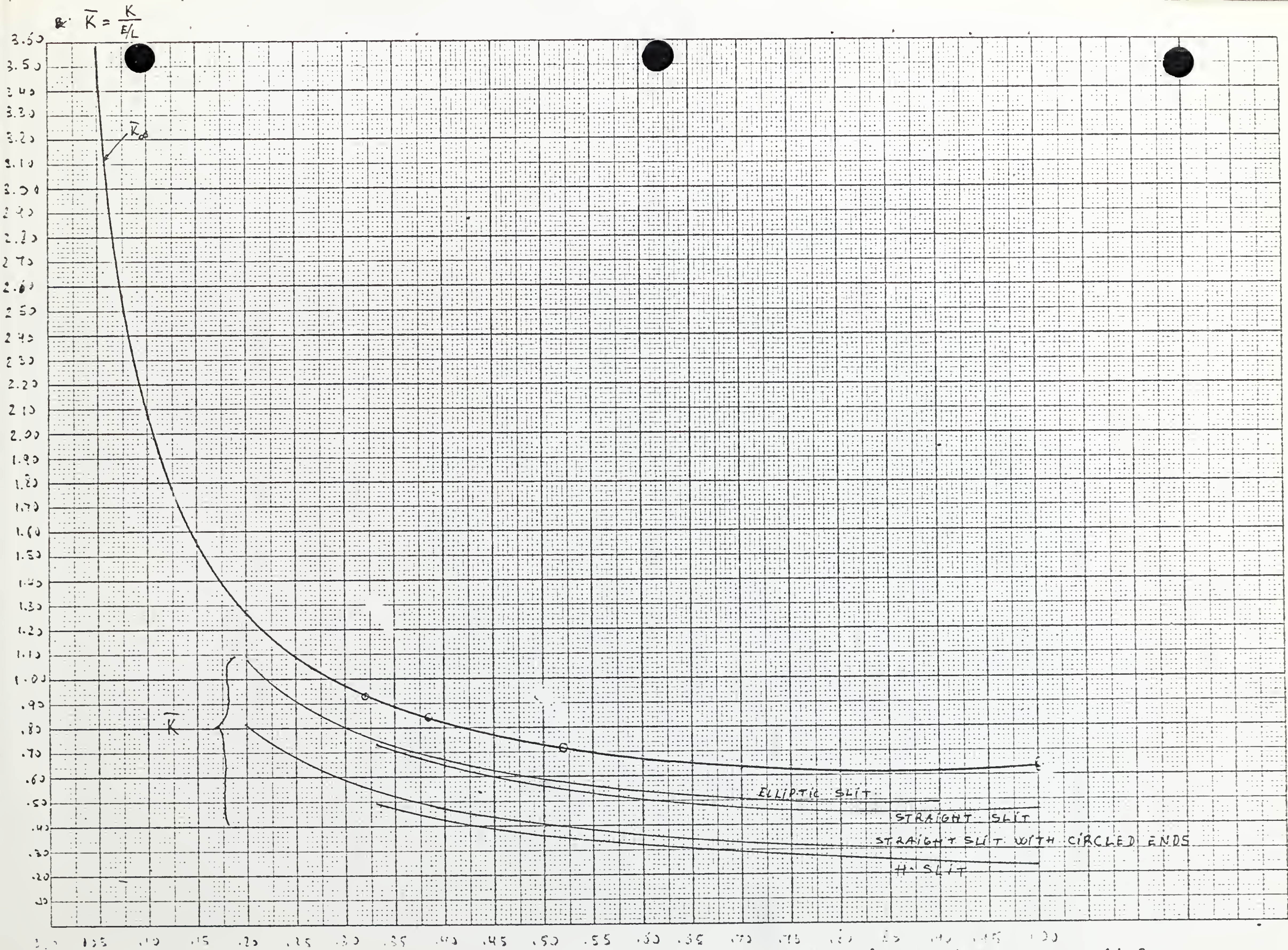


Fig. 9 Values of $\bar{K}$ versus weld length $x = \frac{\ell}{L}$ for ~~diam~~ various weld forms

In the case of a straight slit with circles at the ends, the diameter of the circle is larger than the slit width, the value of $\overline{K}$ is smaller than that for a straight slit without large-circled ends. And the lowest value of $\overline{K}$ is obtained for an H-slit, where the width of the H-branch is larger than that of the weld slit (D/W = 10/3 = 3.33).

All these results seem to conform to common sense and could be considered as an indication of the correctness of the procedure. Theoretically, it cannot be otherwise since it can be proved that, in the finite element method, if the compatibility conditions are satisfied, the results will converge to the true solution as the gridwork becomes finer and finer. In the cases of constant strain element, the compatibility conditions are satisfied.

A full verification of the method is made in the case of the Lehigh specimen (tables 15 and 16). In the case "without sawcut", the results are:

$$K_{calculated} = 48.17 \text{ Kg/mm}^2\text{-mm}, \quad K_{measured} = 44 \text{ Kg/mm}^2\text{-mm}$$

and the difference is $\frac{\Delta K}{K} = \frac{4.17}{48.17} = 7.17\%$. In the case "with sawcut", they are:

$$K_{calculated} = 30.69 \text{ Kg/mm}^2\text{-mm}, \quad K_{measured} = 27 \text{ Kg/mm}^2\text{-mm}$$

and the difference is $\frac{\Delta K}{K} = \frac{3.69}{30.69} = 12.02\%$.

These values of K have been computed by taking the Young's Modulus $E = 21.1 \times 10^3$ Kg/mm^2, which is a little high.

If we take $E = 19.9 \times 10^3$ Kg/mm^2, then we will obtain

$$K' = \frac{48.17}{21.1} \times 19.9 = 45.3 \text{ Kg/mm}^2\text{-mm}$$

for the plate without cut and

$$K' = \frac{30.69}{21.1} \times 19.9 = 28.9 \text{ Kg/mm}^2\text{-mm}$$, for the plate with saw cut.

With these values, the differences between the calculated and measured values of K become:

$$\frac{\Delta K_1}{K_1} = \frac{45.3-44}{45.3} = \frac{1.3}{45.3} = 2.87\%$$

and

$$\frac{\Delta K_2}{K_2} = \frac{28.9-27}{28.94} = \frac{1.9}{28.9} = 6.70\%$$

With these differences, the values of K calculated seem to be acceptable if we think of the complicated boundary condition in the case of the plate with sawcut as described on page 60.

B. <u>Significance of the Results</u>

Coming back to Figure 9, it can be seen that the value $\overline{K}$ increases sharply for a value of $x = \ell/L$ smaller than about 0.30. The degree of constraint K is related to the transverse stress σ_{y_o} by $\sigma_{y_o} = K[\bar{v}]_\ell$. From the empirical Watanabe-Satoh relation, the transverse shrinkage is related to K by

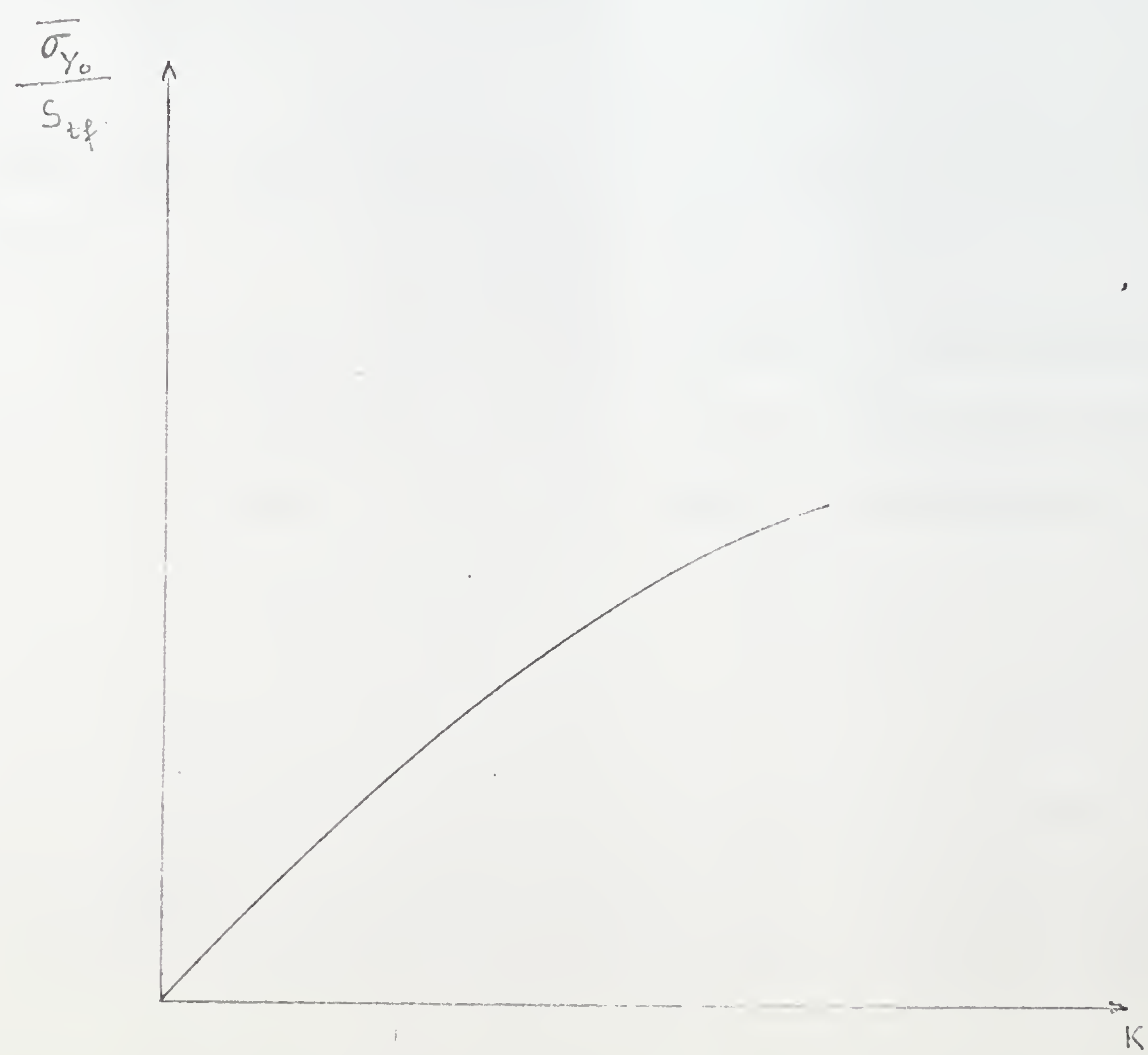
$$S_t = S_{tf} \times \frac{1}{1+0.086\ K^{0.87}}$$

Along the weld line $S_t \cong v$ and for a long straight weld, $[\bar{v}]_\ell \approx v$ since v is almost uniform, except near the ends, then, by substituting the expression of S_t in the relation giving $\overline{\sigma_{y_o}}$, we have:

$$\overline{\sigma_{y_o}} \cong S_{tf} \times \frac{K}{1+0.086\ K^{0.87}},$$

where $\overline{\sigma_{y_o}}$ is the average reaction stress along the weld due to constraint.

The value of $\overline{\sigma_{y_o}}/S_{tf}$ as a function of K is plotted below.



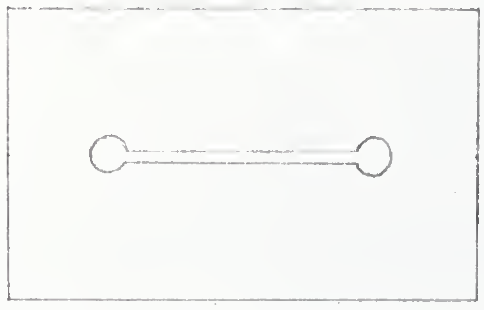
$\overline{\sigma_{Y_o}}$ is an increasing function of K, and could be considered as an indication of the residual stress level near the weld.

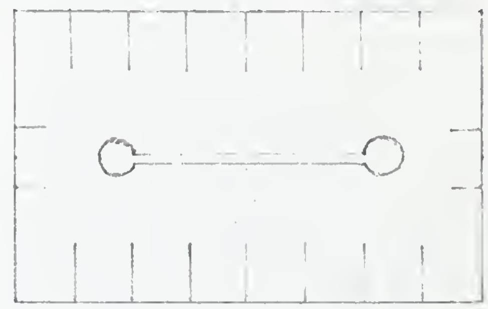
Therefore, it can be said that if a straight slit in a large plate is to be welded, and if the weld is long enough so that more than one block is necessary, the residual stress would be lower if each weld is made symmetrically and if the ratio of the weld length ℓ to the slit length L is larger than about 1/3.

Also, the Watanabe-Satoh relation can present a problem of choice: if the transverse shrinkage is to be limited to small values, then high degree of constraint and consequently high level of residual stress will result. On the contrary, if the residual stress is to be small, then low degree of constraint is necessary (if the degree of constraint can be controlled) and high values of transverse shrinkage will result.

On the other hand, welded structures are subjected to cracking. Mechanical factor is one of the main factors that promote cracking. The reason might be attributed to high residual stress associated with high degree of restraint. Therefore, it may be important to determine a critical value of the degree of restraint K_c necessary to produce cracking. Experimentation is necessary and a series of tests, known as the Lehigh test specimen (reference 4, page 32) is proposed

to determine K_c. Basically, it consists of several plates with a straight weld made along a part of its longitudinal median line. If the plate is not cut, a high degree of con-





straint can be achieved and cracking may occur. To decrease the degree of constraint of the weld, several sawcuts are made along the perimeter of the plate, and the degree of constraint decreases as the length of the sawcut increases. Then there should be some value of the sawcut length for which cracking begins to disappear, the corresponding value of the degree of constraint is the critical value K_c which can be considered as a material constraint for a given weld type.

Thus with the value of K_c determined, we can predict whether a weld will crack or not due to its mechanical restraint, since the value of K can be computed for a given weld configuration. One field of application could be in the patch weld, which consists of welding a circular disc

in a flat plate. If the dimension of the hole is such that the disc dimension is small compared to the plate dimension and the weld can be made in one pass, then we have (reference: Mathematical Theory of Elasticity, by Sokolnikoff, Chapter 5):

$$S_R = \frac{2\sigma_R \cdot R}{E} \qquad \text{(for an infinite plate)}$$

σ_R is the uniform radial stress at the weld,

S_R is the radial shrinkage along the weld and is equal to the sum of the radial displacements of the disc and of the plate at the radial distance, $r = R$.

Then:

$$K = \frac{\sigma_R}{S_R} = \frac{1}{2}\,\frac{E}{R}$$

In this formula, we find that the degree of constraint in the case of a complete patch weld is inversely proportional to R. Therefore, there should be a critical value R_c of R below which $K > K_c$ and the weld will crack.

However, this value of K:

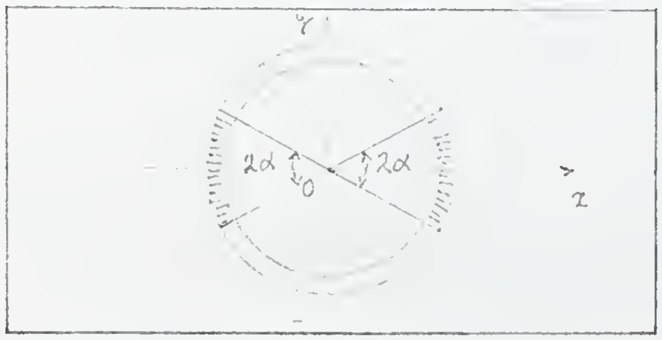
$$K = \frac{E}{2R}$$

is an upper limit, for it is exact only for an infinite plate. For a finite plate, the value of K will be small. The effect of relative dimension could be seen more clearly by examining the expression for the radial stress outside the disc, which is:

$$\sigma_r = \sigma_R \cdot \frac{R^2}{r^2}$$

At infinite, $\sigma_r = 0$. If $R/r = 1/10$, then $\sigma_r/\sigma_R = 1/100$. At a distance equal to 10 times the radius of the disc, the radial stress is one hundredth of the stress at the weld. This value might be still important in some cases.

If the disc is large so that the weld can only be made sector by sector, and if the weld is made symmetrically with respect to the disc center, then with an infinite plate, we



have, for a weld sector of angular value 2α,as in the figure:

$$K(2\alpha) = \frac{\sigma_R}{[\bar{u}_R]_{2\alpha}} = \frac{\Pi E}{2\alpha R} \times \frac{1}{2 - f(2\alpha)}$$

where f(2α) is a convergent series (it converges as $1/n^2$) with $f(\Pi) = f(0) = 0$, $[\bar{u}_R]_{2\alpha}$ is the mean value of the radius displacement taken along the weld angular distance of 2α.

The form of the expression suggests that for K(2α) to be smaller than a critical value K_c:

$$K(2\alpha) < K_c$$

then for a given radius R, there is a value $2\alpha_c$ for which

$$K(2\alpha_c) = K_c$$

and for $\alpha < \alpha_c$, $K > K_c$. Thus, if a large circular disc is to

be welded to a plate and the weld has to be made sector by sector, symmetrical around the origin, then there is a critical value $2\alpha_c$ of the angular weld sector below which the weld might crack and above which the weld would not crack.

III. The Problem Of Experimentation

In the past, experiments have been conducted by actually welding the specimens and measuring the transverse shrinkage and the value of the degree of constraint. Little use has been made of the elastic assumption and of the resulting linear relations between stress and displacement.

One inconvenience of the measurement of the strain due to welding is the high temperature at the weld, and strain gauges had to be put some distance away from the weld. On the other hand, because the weld line is not well defined after the weld is made, the displacements had to be measured also some distance away from the weld. Furthermore, in some cases, weld specimens are difficult to make, as the case of a small slit in a big plate, and consequently expensive.

Taking into account the elastic assumption, it can be noted that for a given average transverse stress, $\bar{\sigma}_{y_o}$, at the weld line, the local displacement and hence the average displacement is inversely proportional to the Young's Modulus E. Therefore, the degree of constraint, defined as:

$$K = \frac{\sigma_{y_o}}{[v]_\ell}$$

is proportional to E, and the ratio of K and E, which has been defined as specific degree of constraint K':

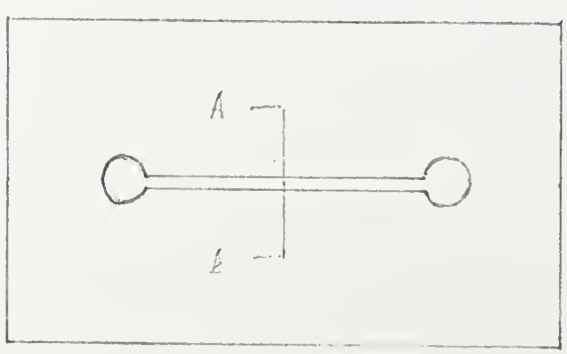
$$K' = \frac{K}{E}$$

is independent of the material, provided that it is linear elastic.

Consequently, there could be a simple method of experimentation in the measurement of the degree of constraint K by having specimens made of material that has a low modulus of elasticity E and by not actually performing the weld but by using some mechanical means to simulate the thermal stress.

One such material could be plastic such as cast phenolic resins for mechanical and chemical purpose whose stress-strain curves are reproduced in Figure 10 (reference:"Technical Data on Plastics", by Manufacturing Chemists' Association, Inc., page 49) and which have a modulus of elasticity in compression of 3×10^5 psi to 5×10^5 psi (ibidem, page 52).

To impose stress in the model, wedges can be driven into the slit. In this case, two similar prismatic wedges with



Sample

Section A-A

Wedges
Cross-section

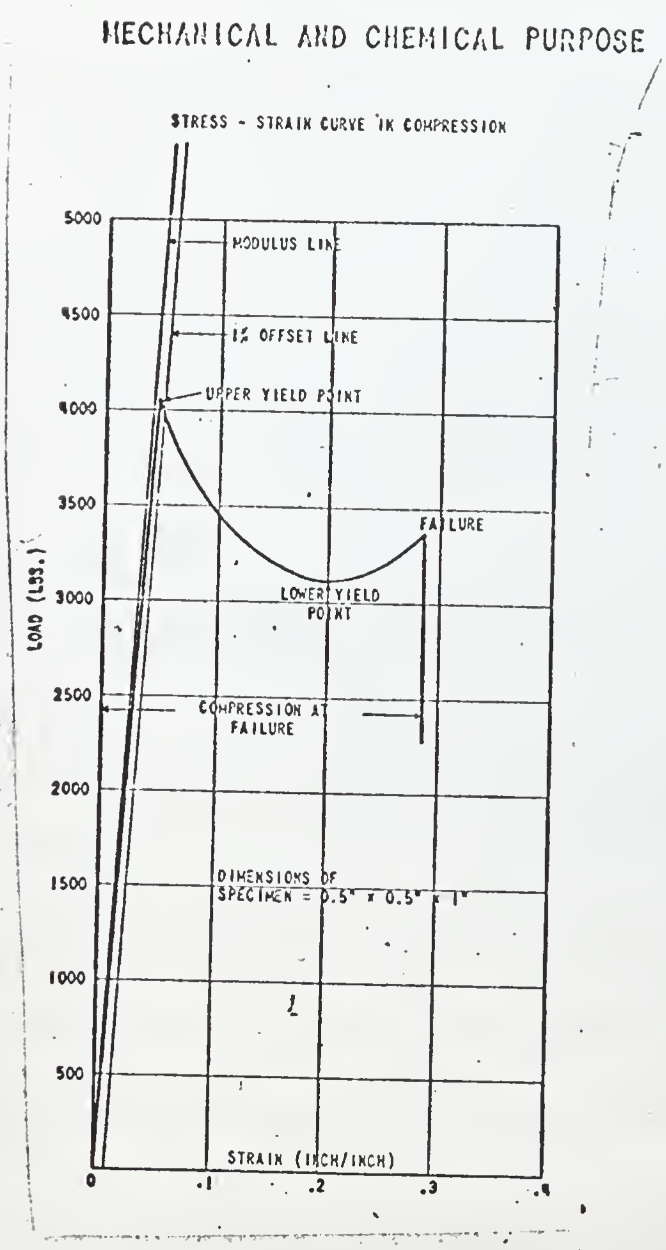
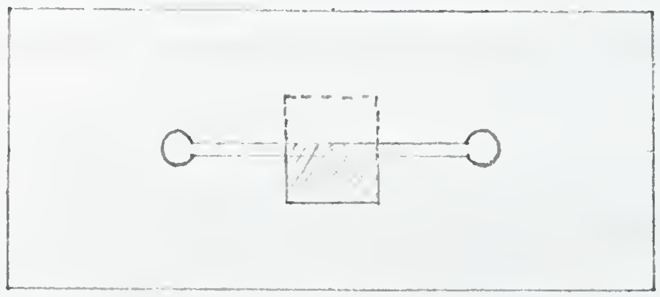


Fig. IO - Stress - Strain Curve of Plastic .

elongated rectangle triangle cross section made by cutting a prismatic wedge with rectangular cross section along the diagonal plane should be used so that the faces in contact with the slit edges remain parallel. The sample will be in compression to minimize the friction between the active faces of the wedges and the slit edges. Some lubricant, such as Teflon, graphite or oil could be used.



The width of the wedge in contact with the plate represents the weld length ℓ. Several sets of wedges with different widths are necessary to establish a curve giving the specific degree of constraint K' as a function of the ratio R between weld length ℓ and slit length L: $R = \ell/L$ for each weld configuration.

To measure the stress, sensible strain gauges can be used along the edges of the slit on both sides. To measure the transverse displacement along the slit, visible marks are made along the edges of the slit and their displacements can be measured by a microscope, or a comparator. After measurement of local stresses and displacements along the load length ℓ, their averages will be computed and the specific degree of constraint K' obtained by :

$$K' = \frac{1}{E} \frac{[\overline{\sigma_{Y_o}}]_\ell}{[\overline{v}]_\ell}$$

For the verification of the Watanabe-Satoh curve, there is,however, unfortunately no simple way and full-size experiments have to be performed. Given a specimen, we can first compute its degree of constraint and deduce its transverse shrinkage using the Watanabe-Satoh curve. Then actual welding is performed and experimental data obtained are compared with computing results.

If the Watanabe-Satoh relation is correct, then the knowledge of the value of K is most important in the transverse shrinkage control since these laboratory results seem to be applicable to actual structures as has been mentioned in reference 3. In these situations, if the degree of constraint can be computed, then the transverse shrinkage can be determined and hence the level of residual stress is also known which will enable one to predict whether weld cracking due to mechanical constraint could happen and subsequently to take necessary corrective steps if possible.

CONCLUSION

The finite element method, with constant strain elements, seems to give consistent results. A qualitative verification of its validity remains somehow in the fact that the results conform to common sense. Two quantitative verifications have been made and the results can be considered to be acceptable, in the case of the Lehigh specimens.

Taking into account the elastic assumption, and the resulting proportionality between the degree of constraint K and the modulus of elasticity E, a method of experimentation that enables the determination of K experimentally has been proposed.

The determination of the transverse shrinkage due to butt weld of a plate structure can be made, if the degree of constraint is known, by using the Watanabe-Satoh correlation between relative transverse shrinkage S_t/S_{tf} and degree of constraint K.

The Watanabe-Satoh correlation has been obtained empirically through experiments performed in three different specimens: the straight slit, the H-slit and the circular ring. Some further experiments on various slit types would be desirable.

If the numerical method proves to be good and the Watanabe-Satoh correlation to be valid, then shrinkage dis-

tortion control is possible. In this case, there are two alternatives, deduced from the Watanabe-Satoh curve: either to accept a high degree of constraint and hence a high level of residual stress and a low value of transverse shrinkage or a low value of the degree of constraint and hence a low level of residual stress and a high value of transverse shrinkage.

On the other hand, welded structures are subjected to cracking. External constraint could be one major mechanical factor contributing to weld cracking. For each material and weld type, there could be a critical degree of constraint, K_c, above which weld cracking may occur and below which it may not. The Lehigh test specimens are used for this purpose. Once the critical value K_c is determined, it will be possible to know in advance whether a weld is crack-susceptible and therefore to decide on its feasibility or corrections if necessary and possible. One example of application can be found in patch welding.

In both cases, distortion control or weld cracking susceptibility verification, it is essential to compute the value of the degree of constraint K of the weld.

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APPENDIX 1A

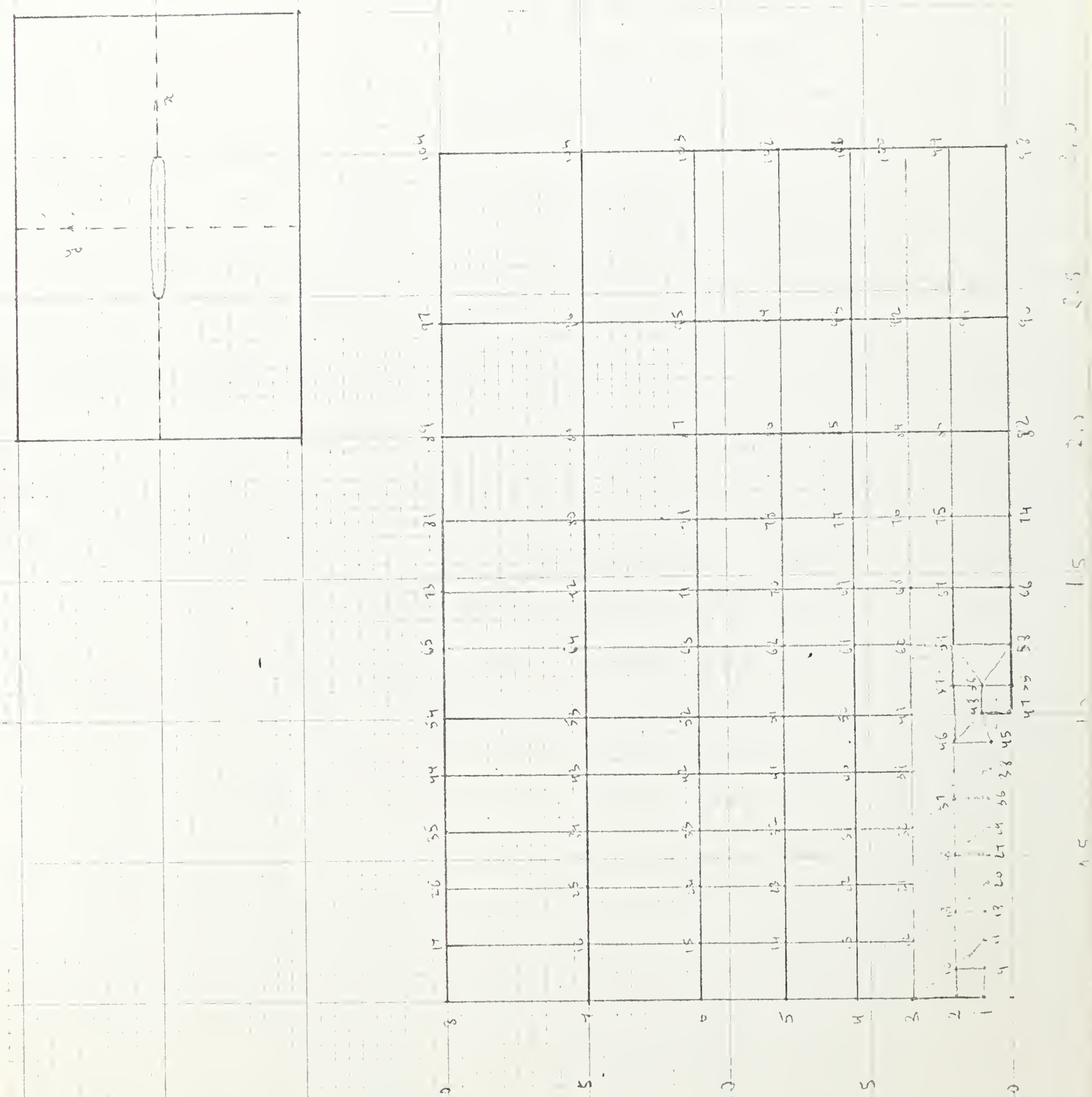
Elliptic Slit , 'CSTG' and 'PSR' type

The following presents :

1- Plate division , the numbers are the names of the nodes, page 2

2- Input data from page 3 to page 12.

3- Output data pp 13 -30.



```
APPENDIX 16 'ELLIPTIC SLIT'
'CSIG' AND 'PSR'
TYPE PLANE STRESS
UNITS INCHES
UNITS POUNDS
JOINT COORDINATES
1 .0 .1 S
2 .0 .2 S
3 .0 .35 S
4 .0 .55 S
5 .0 .8 S
6 .0 1.1 S
7 .0 1.5 S
8 .0 2. S
9 .1 .0996
10 .1 .2
11 .2 .098
12 .2 .35
13 .2 .55
14 .2 .8
15 .2 1.1
16 .2 1.5
17 .2 2.
18 .3 .0955
19 .3 .2
20 .4 .0917
21 .4 .35
```

22 .4 .55

23 .4 .8

24 .4 1.1

25 .4 1.5

26 .4 2.

27 .5 .0866

28 .5 .2

29 .6 .08

30 .6 .35

31 .6 .55

32 .6 .8

33 .6 1.1

34 .6 1.5

35 .6 2.

36 .7 .0714

37 .7 .2

38 .8 .06

39 .8 .35

40 .8 .55

41 .8 .8

42 .8 1.1

43 .8 1.5

44 .8 2.

45 .9 .0436

46 .9 .2

47 1. .0 S

48 1. .1

49 1. .35

50 1. .55

51 1. .8

52 1. 1.1

53 1. 1.5

54 1. 2.

55 1.1 .0 S

56 1.1 .1

57 1.1 .2

58 1.25 .0 S

59 1.25 .2

60 1.25 .35

61 1.25 .55

62 1.25 .8

63 1.25 1.1

64 1.25 1.5

65 1.25 2.

66 1.45 .C S

67 1.45 .2

68 1.45 .35

69 1.45 .55

7C 1.45 .8

71 1.45 1.1

72 1.45 1.5

73 1.45 2.

74 1.7 .0 S

75 1.7 .2

76 1.7 .35

77 1.7 .55

78 1.7 .8

79 1.7 1.1

80 1.7 1.5

81 1.7 2.

82 2. .0 S

83 2. .2

84 2. .35

85 2. .55

86 2. .8

87 2. 1.1

88 2. 1.5

89 2. 2.

90 2.4 .0 S

91 2.4 .2

92 2.4 .35

93 2.4 .55

94 2.4 .8

95 2.4 1.1

96 2.4 1.5

97 2.4 2.

98 3. .0 S

99 3. .2

100 3. .35

101 3. .55

102 3. .8

103 3. 1.1

104 3. 1.5

105 3. 2.

ELEMENT INCIDENCES

1 1 10 2

2 1 9 10

3 9 11 10

4 11 19 10

5 11 18 19

6 18 20 19

7 20 28 19

8 20 27 28

9 27 29 28

10 29 37 28

11 29 36 37

12 36 38 37

13 38 46 37

14 38 45 46

15 45 48 46

16 45 47 48

17 46 48 57

18 48 56 57

19 48 47 56

20 47 55 56

21 2 10 3

22 10 12 3

23 10 19 12

24 19 21 12

25 19 28 21

26 28 30 21

27 28 37 30

28 37 39 30

29 37 46 39

30 46 49 39

31 46 57 49

32 57 60 49

33 57 59 60

34 57 56 59

35 56 58 59

36 56 55 58

37 3 12 13 4

38 13 12 21 22

39 22 21 30 31

40 31 30 39 40

41 40 39 49 50

42 50 49 60 61

43 61 60 68 69

44 60 59 67 68

45 59 58 66 67

46 5 4 13 14

47 14 13 22 23

48	23	22	31	32
49	32	31	40	41
50	41	40	50	51
51	51	50	61	62
52	62	61	69	70
53	70	69	77	78
54	69	68	76	77
55	68	67	75	76
56	67	66	74	75
57	6	5	14	15
58	15	14	23	24
59	24	23	32	33
60	33	32	41	42
61	42	41	51	52
62	52	51	62	63
63	63	62	70	71
64	71	70	78	79
65	79	78	86	87
66	78	77	85	86
67	77	76	84	85
68	76	75	83	84
69	75	74	82	83
70	7	6	15	16
71	16	15	24	25
72	25	24	33	34
73	34	33	42	43
74	43	42	52	53
75	53	52	63	64
76	64	63	71	72
77	72	71	79	80
78	80	79	87	88
79	88	87	95	96
80	87	86	94	95

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81 86 85 93 94
82 85 84 92 93
83 84 83 91 92
84 83 82 90 91
85 8 7 16 17
86 17 16 25 26
87 26 25 34 35
88 35 34 43 44
89 44 43 53 54
90 54 53 64 65
91 65 64 72 73
92 73 72 80 81
93 81 80 88 89
94 89 88 96 97
95 97 96 104 105
96 96 95 103 104
97 95 94 102 103
98 94 93 101 102
99 93 92 100 101
100 92 91 99 100
101 91 90 98 99
ELEMENT PROPERTIES
1 TO 36 TYPE 'CSTG' THICKNESS .2
37 TO 101 TYPE 'PSR' THICKNESS .2
CONSTANTS
E 30000. ALL
POISSON .3 ALL
JOINT RELEASES
1 TO 8 FORCE Y
47 55 58 66 74 82 90 98 FORCE X
LOADING 'ONE' 'R=0.1'
JOINT LOADS
1 FORCE Y -10.
```

```
9 FORCE Y -10.
LOADING 'TWO' 'R=0.2'
JOINT LOADS
1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -10.
LOADING 'THREE' 'R=0.3'
JOINT LOADS
1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -20.
18 FORCE Y -10.
LOADING 'FOUR' 'R=0.4'
JOINT LOADS
1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -20.
18 FORCE Y -20.
20 FORCE Y -10.
LOADING 'FIVE' 'R=0.5'
JOINT LOADS
1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -20.
18 FORCE Y -20.
20 FORCE Y -20.
27 FORCE Y -10.
LOADING 'SIX' 'R'0.6'
**** INPUT WARNING 7.8 - COMMAND NOT COMPLETELY PROCESSED.
**** SYMBOLS IN COMMAND INPUT NOT YET PROCESSED FOLLOW
****.6'                                                    *************
JOINT LOADS
1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -20.
```

```
18 FORCE Y -20.
20 FORCE Y -20.
27 FORCE Y -20.
29 FORCE Y -10.
LOADING 'SEVEN' 'R'C.7'
**** INPUT WARNING 7.8 - COMMAND NOT COMPLETELY PROCESSED.
**** SYMBOLS IN COMMAND INPUT NOT YET PROCESSED FOLLOW
****.7'                                                    *****************
JOINT LOADS
 1 FORCE Y -10.
 9 FORCE Y -20.
11 FORCE Y -20.
18 FORCE Y -20.
20 FORCE Y -20.
27 FORCE Y -20.
29 FORCE Y -20.
36 FORCE Y -10.
LOADING 'EIGHT' 'R=C.8'
JOINT LOADS
 1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -20.
18 FORCE Y -20.
20 FORCE Y -20.
27 FORCE Y -20.
29 FORCE Y -20.
36 FORCE Y -20.
38 FORCE Y -10.
LOADING 'NINE' 'R=0.9'
JOINT LOADS
 1 FORCE Y -10.
9 FORCE Y -20.
11 FORCE Y -20.
18 FORCE Y -20.
```

```
20 FORCE Y -20.
27 FORCE Y -20.
29 FORCE Y -20.
36 FORCE Y -20.
38 FORCE Y -20.
45 FORCE Y -10.
STIFFNESS ANALYSIS
LIST DISPLACEMENTS STRESSES ALL
```

LOADING - ONE R=0.1

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
	/------------------DISPLACEMENT	------------------/	
1	0.0	-0.0190214	
2	0.0	-0.0164176	
3	0.0	-0.0141677	
4	0.0	-0.0119233	
5	0.0	-0.0102618	
6	0.0	-0.0090700	
7	0.0	-0.0082253	
8	0.0	-0.0076143	
47	0.0038303	0.0	
55	0.0033430	0.0	
58	0.0030394	0.0	
66	0.0026877	0.0	
74	0.0024385	0.0	
82	0.0022502	0.0	
90	0.0020848	0.0	
98	0.0018459	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
	/------------------DISPLACEMENT	------------------/	
9	0.0015995	-0.0162619	
10	0.0000280	-0.0151561	
11	0.0021893	-0.0130260	
12	-0.0002631	-0.0123138	
13	-0.0003898	-0.0110877	
14	-0.0003915	-0.0098125	
15	-0.0003477	-0.0087989	
16	-0.0003751	-0.0080443	
17	-0.0007378	-0.0074721	
18	0.0027041	-0.0108832	
19	0.0011566	-0.0108830	
20	0.0029715	-0.0093250	
21	0.0003283	-0.0093653	
22	-0.0004191	-0.0091709	
23	-0.0005996	-0.0086310	
24	-0.0006065	-0.0080450	
25	-0.0007065	-0.0075274	
26	-0.0014134	-0.0070616	
27	0.0031925	-0.0079834	
28	0.0018250	-0.0080113	
29	0.0033595	-0.0067142	
30	0.0007908	-0.0068866	
31	-0.0001465	-0.0070218	
32	-0.0005722	-0.0070738	
33	-0.0007246	-0.0069620	

34	-0.0009623	-0.0067458
35	-0.0013756	-0.0064283
36	0.0035017	-0.0054963
37	0.0020954	-0.0055502
38	0.0035692	-0.0041175
39	0.0010619	-0.0045350
40	0.0002163	-0.0050158
41	-0.0003609	-0.0054677
42	-0.0007031	-0.0057349
43	-0.0011284	-0.0057979
44	-0.0023928	-0.0056379
45	0.0035948	-0.0026374
46	0.0021234	-0.0029113
48	0.0029355	-0.0011155
49	0.0014234	-0.0025362
50	0.0006288	-0.0033290
51	-0.0000539	-0.0040231
52	-0.0005786	-0.0045227
53	-0.0012092	-0.0047855
54	-0.0026559	-0.0047648
56	0.0030173	-0.0004701
57	0.0024373	-0.0010383
59	0.0025131	-0.0005948
60	0.0019086	-0.0011279
61	0.0011081	-0.0018736
62	0.0003483	-0.0025982
63	-0.0003568	-0.0031826
64	-0.0012182	-0.0035610
65	-0.0027892	-0.0036554
67	0.0024364	-0.0003642
68	0.0020267	-0.0006984
69	0.0013818	-0.0011868
70	0.0006187	-0.0017707
71	-0.0001744	-0.0022983
72	-0.0011775	-0.0026771
73	-0.0027728	-0.0028217
75	0.0022961	-0.0002118
76	0.0020293	-0.0003941
77	0.0015394	-0.0006772
78	0.0008468	-0.0010477
79	0.0000117	-0.0014291
80	-0.0011003	-0.0017363
81	-0.0026620	-0.0018849
83	0.0021534	-0.0000873
84	0.0019636	-0.0001628
85	0.0015846	-0.0002833
86	0.0009781	-0.0004553
87	0.0001551	-0.0006517
88	-0.0010063	-0.0008311
89	-0.0024854	-0.0009465
91	0.0020105	0.0000492
92	0.0018603	0.0000810
93	0.0015478	0.0001127
94	0.0010127	0.0001336
95	0.0002293	0.0001383
96	-0.0009206	0.0001313
97	-0.0023082	0.0001053
99	0.0017826	0.0003156
100	0.0016541	0.0005443
101	0.0013824	0.0008237
102	0.0009046	0.0011172
103	0.0001831	0.0013736
104	-0.0009012	0.0015529
105	-0.0022266	0.0016035

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0331751	
2	0.0	-0.0303037	
3	0.0	-0.0272282	
4	0.0	-0.0233361	
5	0.0	-0.0202401	
6	0.0	-0.0179514	
7	0.0	-0.0163048	
8	0.0	-0.0151015	
47	0.0076429	0.0	
55	0.0066645	0.0	
58	0.0060549	0.0	
66	0.0053497	0.0	
74	0.0048511	0.0	
82	0.0044754	0.0	
90	0.0041464	0.0	
98	0.0036717	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0023738	-0.0313961	
10	0.0005612	-0.0293653	
11	0.0038927	-0.0272201	
12	-0.0002953	-0.0242959	
13	-0.0006745	-0.0218518	
14	-0.0007338	-0.0193927	
15	-0.0006745	-0.0174247	
16	-0.0007392	-0.0159489	
17	-0.0014587	-0.0148209	
18	0.0052849	-0.0223224	
19	0.0021572	-0.0223187	
20	0.0059202	-0.0190095	
21	0.0005914	-0.0189392	
22	-0.0007633	-0.0182916	
23	-0.0011457	-0.0171319	
24	-0.0011820	-0.0159560	
25	-0.0013940	-0.0149319	
26	-0.0027953	-0.0140109	
27	0.0063907	-0.0161493	
28	0.0035657	-0.0161888	
29	0.0067207	-0.0135251	
30	0.0015139	-0.0138461	
31	-0.0003100	-0.0140746	
32	-0.0011171	-0.0140949	
33	-0.0014223	-0.0138336	
34	-0.0019016	-0.0133921	
35	-0.0039093	-0.0127605	
36	0.0069991	-0.0110439	
37	0.0041433	-0.0111439	
38	0.0071276	-0.0082565	
39	0.0020769	-0.0090913	

40	0.0003996	-0.0100413
41	-0.0007232	-0.0109140
42	-0.0013899	-0.0114132
43	-0.0022338	-0.0115210
44	-0.0047379	-0.0111987
45	0.0071743	-0.0052840
46	0.00[illegible]2131	-0.0058298
48	0.0058480	-0.0022313
49	0.0028116	-0.0050733
50	0.0012266	-0.0066559
51	-0.0001207	-0.0080310
52	-0.0011512	-0.0090099
53	-0.0023974	-0.0095182
54	-0.0052630	-0.0094712
56	0.0060109	-0.0009383
57	0.0048466	-0.0020741
59	0.0049994	-0.0011862
60	0.0037888	-0.0022509
61	0.0021898	-0.0037407
62	0.0006800	-0.0051850
63	-0.0007147	-0.0063440
64	-0.0024187	-0.0070902
65	-0.0055325	-0.0072732
67	0.0048467	-0.0007256
68	0.0040274	-0.0013925
69	0.0027397	-0.0023678
70	0.0012211	-0.0035328
71	-0.0003522	-0.0045830
72	-0.0023395	-0.0053343
73	-0.0055039	-0.0056188
75	0.0045667	-0.0004221
76	0.0040341	-0.0007858
77	0.0030571	-0.0013511
78	0.0016783	-0.0020908
79	0.0000192	-0.0028515
80	-0.0021871	-0.0034633
81	-0.0052880	-0.0037674
83	0.0042825	-0.0001745
84	0.0039042	-0.0003254
85	0.0031492	-0.0005654
86	0.0019424	-0.0009104
87	0.0003061	-0.0013032
88	-0.0020006	-0.0016614
89	-0.0049402	-0.0018906
91	0.0039984	0.0000970
92	0.0036995	0.0001596
93	0.0030775	0.0002217
94	0.0020130	0.0002621
95	0.0004553	0.0002700
96	-0.0018304	0.0002543
97	-0.0045899	0.0002027
99	0.0035457	0.0006269
100	0.0032902	0.0010813
101	0.0027497	0.0016361
102	0.0017994	0.0022190
103	0.0003645	0.0027278
104	-0.0017917	0.0030834
105	-0.0044282	0.0031839

LOADING - THREE   R=0.3

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0449266	
2	0.0	-0.0421501	
3	0.0	-0.0387690	
4	0.0	-0.0339671	
5	0.0	-0.0297454	
6	0.0	-0.0265019	
7	0.0	-0.0241211	
8	0.0	-0.0223572	
47	0.0114066	0.0	
55	0.0099325	0.0	
58	0.0090148	0.0	
66	0.0079556	0.0	
74	0.0072092	0.0	
82	0.0066489	0.0	
90	0.0061599	0.0	
98	0.0054557	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0027857	-0.0435539	
10	0.0011487	-0.0415530	
11	0.0051781	-0.0406956	
12	0.0000403	-0.0356085	
13	-0.0008091	-0.0320611	
14	-0.0010025	-0.0285718	
15	-0.0009681	-0.0257436	
16	-0.0010848	-0.0236007	
17	-0.0021500	-0.0219448	
18	0.0074196	-0.0352692	
19	0.0031079	-0.0342921	
20	0.0085468	-0.0293237	
21	0.0008346	-0.0286890	
22	-0.0009758	-0.0272471	
23	-0.0016060	-0.0253821	
24	-0.0017070	-0.0236211	
25	-0.0020487	-0.0221116	
26	-0.0041219	-0.0207539	
27	0.0094556	-0.0246203	
28	0.0051437	-0.0246683	
29	0.0100069	-0.0205274	
30	0.0021346	-0.0209236	
31	-0.0004742	-0.0211328	
32	-0.0016104	-0.0209929	
33	-0.0020737	-0.0205305	
34	-0.0028005	-0.0198530	
35	-0.0057688	-0.0189143	
36	0.0104426	-0.0166877	
37	0.0060828	-0.0168254	
38	0.0106360	-0.0124407	
39	0.0030049	-0.0136840	
40	0.0005357	-0.0150712	
41	-0.0010793	-0.0163014	
42	-0.0020458	-0.0169758	
43	-0.0032975	-0.0171013	
44	-0.0069980	-0.0166139	
45	0.0107061	-0.0079488	

46	0.0062247	-0.0087642
48	0.0087019	-0.0033492
49	0.0041297	-0.0076119
50	0.0017709	-0.0099737
51	-0.0002054	-0.0120009
52	-0.0017097	-0.0134216
53	-0.0035468	-0.0141470
54	-0.0077819	-0.0140654
56	0.0089471	-0.0014038
57	0.0071925	-0.0031062
59	0.0074270	-0.0017717
60	0.0056110	-0.0033649
61	0.0032216	-0.0055940
62	0.0009833	-0.0077457
63	-0.0010721	-0.0094598
64	-0.0035858	-0.0105541
65	-0.0081915	-0.0108161
67	0.0072012	-0.0010824
68	0.0059743	-0.0020791
69	0.0040512	-0.0035370
70	0.0017934	-0.0052762
71	-0.0005348	-0.0068379
72	-0.0034719	-0.0079492
73	-0.0081574	-0.0083655
75	0.0067841	-0.0006298
76	0.0059886	-0.0011731
77	0.0045314	-0.0020181
78	0.0024802	-0.0031238
79	0.0000193	-0.0042589
80	-0.0032480	-0.0051689
81	-0.0078457	-0.0056178
83	0.0063614	-0.0002614
84	0.0057977	-0.0004874
85	0.0046735	-0.0008487
86	0.0028787	-0.0013644
87	0.0004491	-0.0019527
88	-0.0029723	-0.0024879
89	-0.0073362	-0.0028280
91	0.0059398	0.0001423
92	0.0054951	0.0002338
93	0.0045702	0.0003240
94	0.0029879	0.0003811
95	0.0006740	0.0003896
96	-0.0027199	0.0003644
97	-0.0068201	0.0002864
99	0.0052685	0.0009299
100	0.0048887	0.0016038
101	0.0040854	0.0024265
102	0.0026732	0.0032904
103	0.0005412	0.0040442
104	-0.0026624	0.0045708
105	-0.0065812	0.0047197

LOADING - FOUR R=0.4

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
	/------------------DISPLACEMENT	------------------/	
1	0.0	-0.0549119	
2	0.0	-0.0522321	

3	0.0	-0.0487686
4	0.0	-0.0436227
5	0.0	-0.0385999
6	0.0	-0.0345716
7	0.0	-0.0315470
8	0.0	-0.0292668
47	0.0151024	0.0
55	0.0131227	0.0
58	0.0118919	0.0
66	0.0104764	0.0
74	0.0094846	0.0
82	0.0087438	0.0
90	0.0081002	0.0
98	0.0071761	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0030537	-0.0537768	
10	0.0015703	-0.0518083	
11	0.0059167	-0.0515963	
12	0.0006055	-0.0459186	
13	-0.0007890	-0.0415037	
14	-0.0011881	-0.0371770	
15	-0.0012185	-0.0336132	
16	-0.0014042	-0.0308763	
17	-0.0027984	-0.0287321	
18	0.0086725	-0.0476296	
19	0.0042484	-0.0456706	
20	0.0105844	-0.0410436	
21	0.0012460	-0.0382330	
22	-0.0010364	-0.0358376	
23	-0.0019551	-0.0332390	
24	-0.0021650	-0.0309169	
25	-0.0026567	-0.0289547	
26	-0.0053680	-0.0271875	
27	0.0123141	-0.0337411	
28	0.0064128	-0.0337760	
29	0.0131895	-0.0279215	
30	0.0026104	-0.0282361	
31	-0.0005894	-0.0281262	
32	-0.0020292	-0.0276738	
33	-0.0026594	-0.0269558	
34	-0.0036410	-0.0260330	
35	-0.0075195	-0.0247990	
36	0.0138185	-0.0225278	
37	0.0078383	-0.0226840	
38	0.0140799	-0.0167155	
39	0.0037931	-0.0183438	
40	0.0006113	-0.0201101	
41	-0.0014151	-0.0215799	
42	-0.0026552	-0.0223532	
43	-0.0042999	-0.0224621	
44	-0.0091327	-0.0218075	
45	0.0141720	-0.0106501	
46	0.0081103	-0.0117291	
48	0.0114685	-0.0044712	
49	0.0053383	-0.0101563	
50	0.0022358	-0.0132782	
51	-0.0003115	-0.0159084	
52	-0.0022443	-0.0177111	

53	-0.0046380	-0.0186140
54	-0.0101696	-0.0184870
56	0.0117979	-0.0018646
57	0.0094408	-0.0041330
59	0.0097651	-0.0023477
60	0.0073444	-0.0044647
61	0.0041777	-0.0074258
62	0.0012457	-0.0102647
63	-0.0014265	-0.0125023
64	-0.0047018	-0.0139147
65	-0.0107237	-0.0142422
67	0.0094708	-0.0014315
68	0.0078396	-0.0027533
69	0.0052923	-0.0046874
70	0.0023213	-0.0069894
71	-0.0007233	-0.0090448
72	-0.0045589	-0.0104965
73	-0.0106933	-0.0110321
75	0.0089207	-0.0008331
76	0.0078667	-0.0015530
77	0.0059401	-0.0026741
78	0.0032377	-0.0041399
79	0.0000086	-0.0056411
80	-0.0042693	-0.0068395
81	-0.0102992	-0.0074242
83	0.0083639	-0.0003475
84	0.0076196	-0.0006483
85	0.0061365	-0.0011293
86	0.0037728	-0.0018156
87	0.0005801	-0.0025976
88	-0.0039091	-0.0033069
89	-0.0096419	-0.0037529
91	0.0078102	0.0001838
92	0.0072244	0.0003015
93	0.0060065	0.0004163
94	0.0039242	0.0004863
95	0.0008817	0.0004919
96	-0.0035782	0.0004538
97	-0.0089710	0.0003502
99	0.0069297	0.0012203
100	0.0064298	0.0021045
101	0.0053728	0.0031835
102	0.0035149	0.0043160
103	0.0007109	0.0053033
104	-0.0035024	0.0059928
105	-0.0086591	0.0061877

LOADING - FIVE R=0.5

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/----------DISPLACEMENT----------		/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0634834	
2	0.0	-0.0608986	
3	0.0	-0.0574513	
4	0.0	-0.0521739	
5	0.0	-0.0466426	
6	0.0	-0.0420111	
7	0.0	-0.0384484	
8	0.0	-0.0357075	

47	0.0186905	0.0
55	0.0161940	0.0
58	0.0146463	0.0
66	0.0128733	0.0
74	0.0116413	0.0
82	0.0107264	0.0
90	0.0099360	0.0
98	0.0088052	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT------------------/		
	X DISP.	Y DISP.	Z DISP.
9	0.0032263	-0.0625137	
10	0.0018988	-0.0605709	
11	0.0063364	-0.0607102	
12	0.0011590	-0.0548886	
13	-0.0006432	-0.0499927	
14	-0.0012913	-0.0450451	
15	-0.0014197	-0.0408886	
16	-0.0016907	-0.0376449	
17	-0.0033907	-0.0350628	
18	0.0094382	-0.0573005	
19	0.0053064	-0.0553351	
20	0.0121553	-0.0522133	
21	0.0019200	-0.0471901	
22	-0.0009517	-0.0438523	
23	-0.0021834	-0.0405504	
24	-0.0025452	-0.0377114	
25	-0.0032054	-0.0353400	
26	-0.0065086	-0.0331990	
27	0.0146911	-0.0444217	
28	0.0075380	-0.0434262	
29	0.0159895	-0.0359617	
30	0.0029880	-0.0357085	
31	-0.0006206	-0.0349228	
32	-0.0023574	-0.0340186	
33	-0.0031645	-0.0329978	
34	-0.0044062	-0.0318259	
35	-0.0091272	-0.0303134	
36	0.0169973	-0.0286602	
37	0.0093512	-0.0288238	
38	0.0173831	-0.0211529	
39	0.0044095	-0.0230902	
40	0.0006358	-0.0251134	
41	-0.0017162	-0.0266712	
42	-0.0032037	-0.0274588	
43	-0.0052212	-0.0275145	
44	-0.0111010	-0.0266928	
45	0.0175197	-0.0134140	
46	0.0098130	-0.0147484	
48	0.0140983	-0.0056051	
49	0.0063982	-0.0127057	
50	0.0026048	-0.0165502	
51	-0.0004363	-0.0197073	
52	-0.0027437	-0.0218150	
53	-0.0056505	-0.0228483	
54	-0.0123815	-0.0226644	
56	0.0145200	-0.0023198	
57	0.0115464	-0.0051530	
59	0.0119731	-0.0029101	
60	0.0089540	-0.0055428	

61	0.0050332	-0.0092219
62	0.0014582	-0.0127152
63	-0.0017730	-0.0154310
64	-0.0057470	-0.0171222
65	-0.0130835	-0.0174987
67	0.0116183	-0.0017694
68	0.0095897	-0.0034091
69	0.0064373	-0.0058085
70	0.0027911	-0.0086540
71	-0.0009168	-0.0111761
72	-0.0055823	-0.0129408
73	-0.0130675	-0.0135799
75	0.0109420	-0.0010299
76	0.0096367	-0.0019216
77	0.0072572	-0.0033120
78	0.0039352	-0.0051284
79	-0.0000148	-0.0069822
80	-0.0052346	-0.0084538
81	-0.0126073	-0.0091624
83	0.0102575	-0.0004322
84	0.0093397	-0.0008067
85	0.0075131	-0.0014057
86	0.0046083	-0.0022602
87	0.0006952	-0.0032319
88	-0.0047966	-0.0041100
89	-0.0118202	-0.0046552
91	0.0095794	0.0002204
92	0.0088591	0.0003609
93	0.0073625	0.0004958
94	0.0043058	0.0005739
95	0.0010740	0.0005722
96	-0.0043923	0.0005182
97	-0.0110089	0.0003895
99	0.0085026	0.0014931
100	0.0078889	0.0025747
101	0.0065911	0.0038941
102	0.0043108	0.0052779
103	0.0008702	0.0064831
104	-0.0042991	0.0073241
105	-0.0106300	0.0075618

LOADING - SIX R

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/---------DISPLACEMENT---------/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0707884	
2	0.0	-0.0682769	
3	0.0	-0.0648763	
4	0.0	-0.0595567	
5	0.0	-0.0537413	
6	0.0	-0.0486767	
7	0.0	-0.0446858	
8	0.0	-0.0415487	
47	0.0221541	0.0	
55	0.0191168	0.0	
58	0.0172415	0.0	
66	0.0151083	0.0	
74	0.0136403	0.0	
82	0.0125598	0.0	

90	0.0116327	0.0
98	0.0103124	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0033847	-0.0699062	
10	0.0021443	-0.0679975	
11	0.0066860	-0.0682948	
12	0.0016194	-0.0624736	
13	-0.0004265	-0.0573985	
14	-0.0013255	-0.0520324	
15	-0.0015720	-0.0474258	
16	-0.0019391	-0.0437698	
17	-0.0039147	-0.0408084	
18	0.0100152	-0.0651887	
19	0.0060881	-0.0632396	
20	0.0131542	-0.0608400	
21	0.0027212	-0.0551791	
22	-0.0007476	-0.0510657	
23	-0.0023023	-0.0471508	
24	-0.0028436	-0.0438639	
25	-0.0036841	-0.0411381	
26	-0.0075202	-0.0386666	
27	0.0161464	-0.0545157	
28	0.0087973	-0.0524608	
29	0.0181441	-0.0454196	
30	0.0034535	-0.0429135	
31	-0.0005579	-0.0412906	
32	-0.0025841	-0.0398712	
33	-0.0035798	-0.0385277	
34	-0.0050804	-0.0371136	
35	-0.0105584	-0.0353463	
36	0.0199076	-0.0353823	
37	0.0104816	-0.0355002	
38	0.0205088	-0.0259041	
39	0.0048148	-0.0279922	
40	0.0006563	-0.0299785	
41	-0.0019661	-0.0314618	
42	-0.0036765	-0.0321847	
43	-0.0060421	-0.0321559	
44	-0.0128618	-0.0311716	
45	0.0207271	-0.0163005	
46	0.0112500	-0.0178732	
48	0.0165500	-0.0067630	
49	0.0072569	-0.0152638	
50	0.0028654	-0.0197696	
51	-0.0005675	-0.0233299	
52	-0.0031944	-0.0256518	
53	-0.0065625	-0.0267653	
54	-0.0143713	-0.0265145	
56	0.0170744	-0.0027654	
57	0.0134566	-0.0061624	
59	0.0140073	-0.0034514	
60	0.0104002	-0.0065887	
61	0.0057607	-0.0109637	
62	0.0016142	-0.0150625	
63	-0.0021028	-0.0181929	
64	-0.0066994	-0.0201149	
65	-0.0152218	-0.0205224	
67	0.0136056	-0.0020905	

68	0.0111881	-0.0040371
69	0.0074580	-0.0068839
70	0.0031899	-0.0102457
71	-0.0011117	-0.0131956
72	-0.0065209	-0.0152368
73	-0.0152308	-0.0159625
75	0.0128103	-0.0012167
76	0.0112640	-0.0022728
77	0.0084550	-0.0039225
78	0.0045562	-0.0060742
79	-0.0000518	-0.0082605
80	-0.0061246	-0.0099837
81	-0.0147233	-0.0108009
83	0.0120067	-0.0005141
84	0.0109250	-0.0009601
85	0.0087758	-0.0016740
86	0.0053675	-0.0026916
87	0.0007912	-0.0038464
88	-0.0056174	-0.0048848
89	-0.0138279	-0.0055201
91	0.0112139	0.0002513
92	0.0103682	0.0004102
93	0.0086121	0.0005602
94	0.0056152	0.0006409
95	0.0012466	0.0006271
96	-0.0051464	0.0005539
97	-0.0128944	0.0004011
99	0.0099576	0.0017429
100	0.0092382	0.0030051
101	0.0077172	0.0045441
102	0.0050456	0.0061566
103	0.0010162	0.0075594
104	-0.0050369	0.0085373
105	-0.0124557	0.0088137

LOADING - SEVEN R

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-------DISPLACEMENT	-------/	
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0768688	
2	0.0	-0.0744145	
3	0.0	-0.0710667	
4	0.0	-0.0657532	
5	0.0	-0.0597821	
6	0.0	-0.0544265	
7	0.0	-0.0501130	
8	0.0	-0.0466501	
47	0.0254002	0.0	
55	0.0218095	0.0	
58	0.0196082	0.0	
66	0.0171195	0.0	
74	0.0154283	0.0	
82	0.0141951	0.0	
90	0.0131449	0.0	
98	0.0116574	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	DISPLACEMENT		
	X DISP.	Y DISP.	Z DISP.
9	0.0035163	-0.0760364	
10	0.0023303	-0.0741603	
11	0.0069600	-0.0745232	
12	0.0019875	-0.0687629	
13	-0.0002108	-0.0636252	
14	-0.0013134	-0.0580069	
15	-0.0016802	-0.0530797	
16	-0.0021455	-0.0491060	
17	-0.0043595	-0.0458303	
18	0.0104291	-0.0716065	
19	0.0066877	-0.0696715	
20	0.0137731	-0.0676565	
21	0.0034343	-0.0618052	
22	-0.0004694	-0.0572469	
23	-0.0023375	-0.0528710	
24	-0.0030636	-0.0492256	
25	-0.0040847	-0.0462083	
26	-0.0083811	-0.0434571	
27	0.0170658	-0.0618717	
28	0.0099243	-0.0597688	
29	0.0198071	-0.0542436	
30	0.0040941	-0.0494271	
31	-0.0004102	-0.0469770	
32	-0.0027114	-0.0450522	
33	-0.0039027	-0.0433997	
34	-0.0056503	-0.0417638	
35	-0.0117817	-0.0397726	
36	0.0222969	-0.0435322	
37	0.0114076	-0.0425285	
38	0.0231700	-0.0311901	
39	0.0050637	-0.0329095	
40	0.0007064	-0.0345297	
41	-0.0021525	-0.0358018	
42	-0.0040630	-0.0364000	
43	-0.0067445	-0.0362665	
44	-0.0143752	-0.0351303	
45	0.0236327	-0.0193708	
46	0.0123673	-0.0211516	
48	0.0187212	-0.0079735	
49	0.0078871	-0.0178095	
50	0.0030308	-0.0228563	
51	-0.0006908	-0.0266703	
52	-0.0035823	-0.0291140	
53	-0.0073520	-0.0302609	
54	-0.0160925	-0.0299376	
56	0.0193831	-0.0032036	
57	0.0151062	-0.0071598	
59	0.0158068	-0.0039652	
60	0.0116403	-0.0075841	
61	0.0063413	-0.0126153	
62	0.0017154	-0.0172457	
63	-0.0024043	-0.0207122	
64	-0.0075347	-0.0228118	
65	-0.0170864	-0.0232328	
67	0.0153765	-0.0023885	
68	0.0125901	-0.0046249	
69	0.0083269	-0.0078907	
70	0.0035090	-0.0117247	
71	-0.0013011	-0.0150494	
72	-0.0073506	-0.0173220	
73	-0.0171293	-0.0181097	

75	0.0144756	-0.0013892
76	0.0127046	-0.0025985
77	0.0095010	-0.0044908
78	0.0050846	-0.0069535
79	-0.0001010	-0.0094419
80	-0.0069165	-0.0113876
81	-0.0165930	-0.0122952
83	0.0135647	-0.0005912
84	0.0123333	-0.0011047
85	0.0098311	-0.0019272
86	0.0060301	-0.0030989
87	0.0008652	-0.0044245
88	-0.0063507	-0.0056099
89	-0.0156131	-0.0063238
91	0.0126701	0.0002755
92	0.0117114	0.0004483
93	0.0097220	0.0006077
94	0.0063306	0.0006857
95	0.0013945	0.0006554
96	-0.0058215	0.0005605
97	-0.0145783	0.0003854
99	0.0112559	0.0019631
100	0.0104417	0.0033845
101	0.0087209	0.0051165
102	0.0056993	0.0069294
103	0.0011442	0.0085042
104	-0.0056972	0.0096009
105	-0.0140889	0.0099108

LOADING - EIGHT R=0.8

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------	DISPLACEMENT	-----------------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0816633	
2	0.0	-0.0792502	
3	0.0	-0.0759463	
4	0.0	-0.0706540	
5	0.0	-0.0646051	
6	0.0	-0.0590722	
7	0.0	-0.0545346	
8	0.0	-0.0508220	
47	0.0283854	0.0	
55	0.0242054	0.0	
58	0.0216707	0.0	
66	0.0188303	0.0	
74	0.0169330	0.0	
82	0.0155654	0.0	
90	0.0144105	0.0	
98	0.0127843	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----------------	DISPLACEMENT	-----------------/
	X DISP.	Y DISP.	Z DISP.
9	0.0036272	-0.0808557	

10	0.0024668	-0.0790097
11	0.0071870	-0.0793905
12	0.0022564	-0.0736959
13	-0.0000309	-0.0685421
14	-0.0012767	-0.0627940
15	-0.0017502	-0.0576588
16	-0.0023056	-0.0534593
17	-0.0047118	-0.0499408
18	0.0107701	-0.0765671
19	0.0071199	-0.0746531
20	0.0142572	-0.0728108
21	0.0039764	-0.0669124
22	-0.0001811	-0.0621822
23	-0.0023177	-0.0575045
24	-0.0032121	-0.0535986
25	-0.0043977	-0.0503604
26	-0.0090650	-0.0473883
27	0.0177371	-0.0672871
28	0.0107133	-0.0651865
29	0.0203485	-0.0603015
30	0.0047820	-0.0547995
31	-0.0002097	-0.0516802
32	-0.0027585	-0.0493286
33	-0.0041331	-0.0474158
34	-0.0061001	-0.0455945
35	-0.0127582	-0.0434199
36	0.0236985	-0.0509101
37	0.0124181	-0.0487284
38	0.0250820	-0.0377371
39	0.0053241	-0.0373361
40	0.0007911	-0.0384618
41	-0.0022679	-0.0394712
42	-0.0043543	-0.0399194
43	-0.0073055	-0.0396778
44	-0.0155904	-0.0384098
45	0.0261252	-0.0228341
46	0.0130166	-0.0247029
48	0.0204962	-0.0092833
49	0.0082490	-0.0203232
50	0.0031437	-0.0256453
51	-0.0007901	-0.0295579
52	-0.0038909	-0.0320426
53	-0.0079906	-0.0331861
54	-0.0174839	-0.0327916
56	0.0213593	-0.0036277
57	0.0163955	-0.0081380
59	0.0172888	-0.0044316
60	0.0126139	-0.0084917
61	0.0067528	-0.0141193
62	0.0017710	-0.0191626
63	-0.0026604	-0.0228724
64	-0.0082198	-0.0250934
65	-0.0186072	-0.0255132
67	0.0168586	-0.0026493
68	0.0137358	-0.0051492
69	0.0090080	-0.0087868
70	0.0037402	-0.0130267
71	-0.0014725	-0.0166523
72	-0.0080375	-0.0191021
73	-0.0186887	-0.0199326
75	0.0158702	-0.0015396
76	0.0138992	-0.0028839
77	0.0103524	-0.0049923
78	0.0055004	-0.0077270
79	-0.0001577	-0.0104726
80	-0.0075774	-0.0126005

81	-0.0181411	-0.0135767
83	0.0143677	-0.0006595
84	0.0135068	-0.0012335
85	0.0108130	-0.0021535
86	0.0065695	-0.0034627
87	0.0009152	-0.0049386
88	-0.0069660	-0.0062504
89	-0.0171020	-0.0070278
91	0.0138879	0.0002925
92	0.0128333	0.0004743
93	0.0106462	0.0006379
94	0.0069226	0.0007084
95	0.0015116	0.0006587
96	-0.0063894	0.0005411
97	-0.0159903	0.0003465
99	0.0123434	0.0021452
100	0.0114494	0.0036979
101	0.0095603	0.0055888
102	0.0062445	0.0075656
103	0.0012487	0.0092802
104	-0.0062526	0.0104727
105	-0.0154610	0.0108096

LOADING - NINE R=0.9

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------DISPLACEMENT-----------------/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0850353	
2	0.0	-0.0826494	
3	0.0	-0.0793785	
4	0.0	-0.0741104	
5	0.0	-0.0680318	
6	0.0	-0.0624048	
7	0.0	-0.0577312	
8	0.0	-0.0538499	
47	0.0310150	0.0	
55	0.0261656	0.0	
58	0.0232868	0.0	
66	0.0201329	0.0	
74	0.0180622	0.0	
82	0.0165881	0.0	
90	0.0153533	0.0	
98	0.0136250	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----------------DISPLACEMENT-----------------/		
	X DISP.	Y DISP.	Z DISP.
9	0.0037056	-0.0842386	
10	0.0025569	-0.0824148	
11	0.0073451	-0.0827932	
12	0.0024349	-0.0771531	
13	0.0000938	-0.0720068	
14	-0.0012374	-0.0662013	
15	-0.0017892	-0.0609505	

16	-0.0024153	-0.0566108
17	-0.0049584	-0.0529270
18	0.0110033	-0.0800133
19	0.0074025	-0.0781165
20	0.0145717	-0.0763407
21	0.0043446	-0.0704582
22	0.0000462	-0.0656680
23	-0.0022736	-0.0608285
24	-0.0032987	-0.0567615
25	-0.0046138	-0.0533780
26	-0.0095452	-0.0502520
27	0.0181342	-0.0709586
28	0.0112331	-0.0688602
29	0.0213822	-0.0642677
30	0.0053093	-0.0585609
31	-0.0000037	-0.0550807
32	-0.0027529	-0.0524460
33	-0.0042749	-0.0503506
34	-0.0064137	-0.0483954
35	-0.0134472	-0.0460885
36	0.0244242	-0.0553001
37	0.0132286	-0.0529918
38	0.0263409	-0.0433576
39	0.0056585	-0.0407727
40	0.0008980	-0.0414421
41	-0.0023152	-0.0422127
42	-0.0045449	-0.0425252
43	-0.0077013	-0.0421916
44	-0.0164535	-0.0408234
45	0.0277842	-0.0275261
46	0.0134052	-0.0281706
48	0.0215533	-0.0107645
49	0.0084032	-0.0225592
50	0.0032325	-0.0278836
51	-0.0008527	-0.0317737
52	-0.0041043	-0.0342425
53	-0.0084470	-0.0353613
54	-0.0184795	-0.0349064
56	0.0228167	-0.0040188
57	0.0172394	-0.0090751
59	0.0183554	-0.0048399
60	0.0132718	-0.0092629
61	0.0070007	-0.0153582
62	0.0017949	-0.0206664
63	-0.0028508	-0.0245219
64	-0.0087171	-0.0268109
65	-0.0197060	-0.0272200
67	0.0179600	-0.0028576
68	0.0145584	-0.0055768
69	0.0094734	-0.0095098
70	0.0038843	-0.0140553
71	-0.0016084	-0.0178894
72	-0.0085414	-0.0204559
73	-0.0198243	-0.0213090
75	0.0169097	-0.0016576
76	0.0147781	-0.0031096
77	0.0109639	-0.0053913
78	0.0057875	-0.0083384
79	-0.0002122	-0.0112770
80	-0.0080669	-0.0135355
81	-0.0192784	-0.0145572
83	0.0158378	-0.0007140
84	0.0143763	-0.0013366
85	0.0114894	-0.0023351
86	0.0069578	-0.0037546
87	0.0009423	-0.0053483

88	-0.0074249	-0.0067563
89	-0.0182050	-0.0075737
91	0.0147945	0.0003024
92	0.0136670	0.0004886
93	0.0113305	0.0006517
94	0.0073575	0.0007120
95	0.0015932	0.0006430
96	-0.0068145	0.0005046
97	-0.0170429	0.0002950
99	0.0131544	0.0022787
100	0.0122005	0.0039276
101	0.0101851	0.0059344
102	0.0066492	0.0080300
103	0.0013244	0.0098448
104	-0.0066681	0.0111053
105	-0.0164863	0.0114613

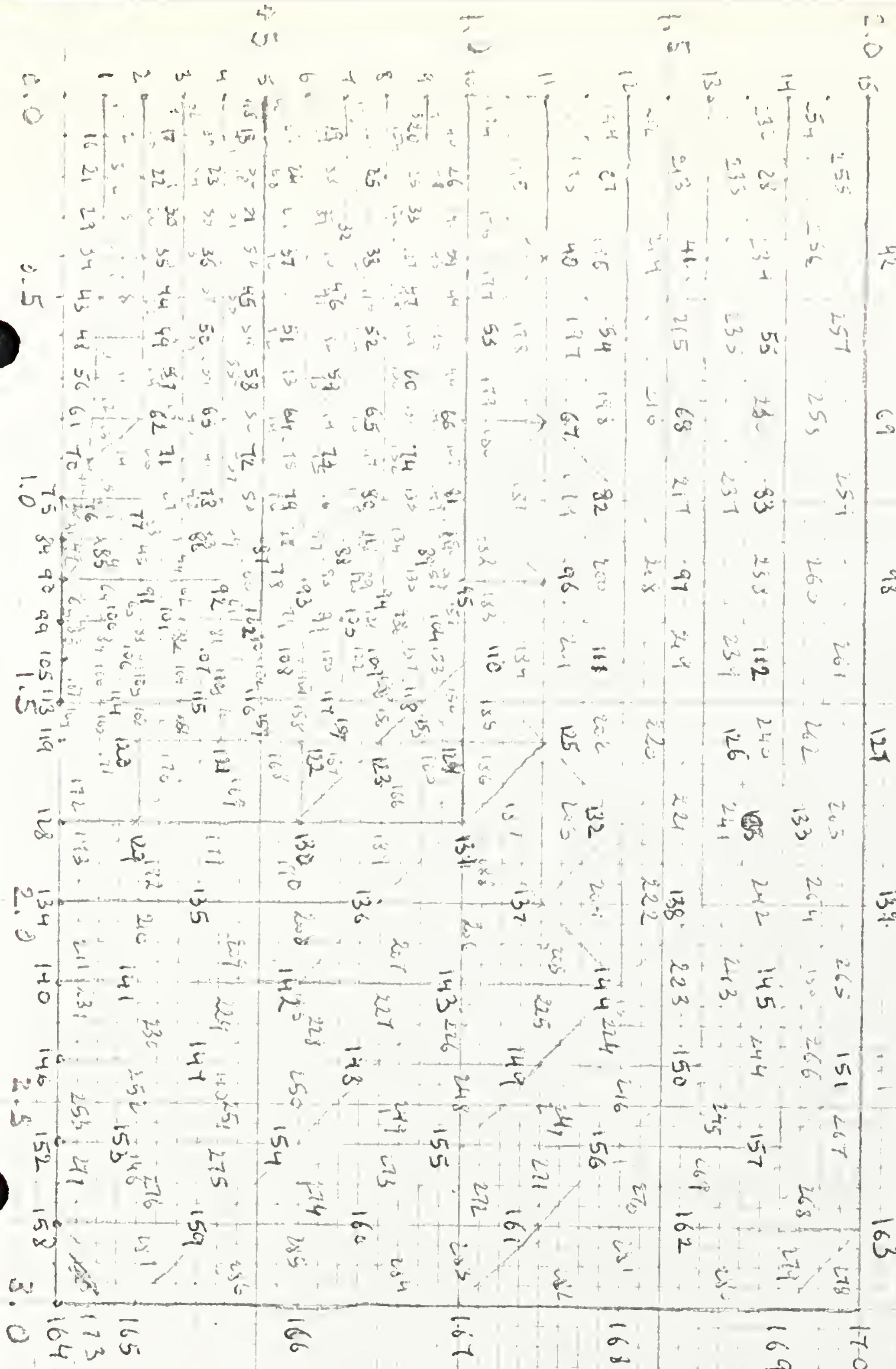
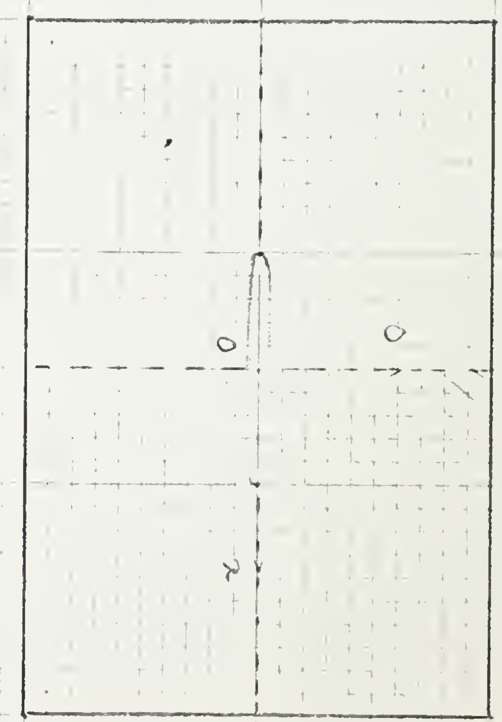
APPENDIX 1B

Elliptic slit , 'CSTG' , fine gridwork .

The following presents :

1- Plate division, the numbers are node names , page 32.

2- Input data , pp 33 - 48 .

3- Output data , pp 49 - 75 .



```
          APPENDIX 1B  'ELLIPTIC SLIT'
          'CSTG' FINER GRIDWORK
TYPE PLANE STRESS
          UNITS INCHES
          UNITS POUNDS
JOINT COORDINATES
             1  0.0  0.1  S
             2  0.0  0.2  S
             3  0.0  0.3  S
             4  0.0  0.4  S
             5  0.0  0.5  S
             6  0.0  0.6  S
             7  0.0  0.7  S
             8  0.0  0.8  S
             9  0.0  0.9  S
            10  0.0  1.0  S
            11  0.0  1.2  S
            12  0.0  1.4  S
            13  0.0  1.6  S
            14  0.0  1.8  S
            15  0.0  2.0  S
            16  0.1  0.0006
            17  0.1  0.3
            18  0.1  0.5
            19  0.1  0.7
            20  0.1  0.9
            21  0.2  0.0080
```

22 0.2 0.2

23 0.2 0.4

24 0.2 0.6

25 0.2 0.8

26 0.2 1.0

27 0.2 1.4

28 0.2 1.8

29 0.3 0.0955

30 0.3 0.3

31 0.3 0.5

32 0.3 0.7

33 0.3 0.9

34 0.4 0.0917

35 0.4 0.2

36 0.4 0.4

37 0.4 0.6

38 0.4 0.8

39 0.4 1.0

40 0.4 1.2

41 0.4 1.6

42 0.4 2.0

43 0.5 0.0866

44 0.5 0.3

45 0.5 0.5

46 0.5 0.7

47 0.5 0.9

48 0.6 0.0800

49 0.6 0.2

50 0.6 0.4

51 0.6 0.6

52 0.6 0.8

53 0.6 1.0

54 0.6 1.4

```
55 0.6 1.8
56 0.7 0.0714
57 0.7 0.3
58 0.7 0.5
59 0.7 0.7
60 0.7 0.9
61 0.8 0.0600
62 0.8 0.2
63 0.8 0.4
64 0.8 0.6
65 0.8 0.8
66 0.8 1.0
67 0.8 1.2
68 0.8 1.6
69 0.8 2.0
70 0.9 0.0436
71 0.9 0.3
72 0.9 0.5
73 0.9 0.7
74 0.9 0.9
75 1.0 0.0 S
76 1.0 0.1
77 1.0 0.2
78 1.0 0.4
79 1.0 0.6
80 1.0 0.8
81 1.0 1.0
82 1.0 1.4
83 1.0 1.8
84 1.1 0.0 S
85 1.1 0.1
86 1.1 0.3
87 1.1 0.5
```

88 1.1 0.7

89 1.1 0.9

90 1.2 0.0 S

91 1.2 0.2

92 1.2 0.4

93 1.2 0.6

94 1.2 0.8

95 1.2 1.0

96 1.2 1.2

97 1.2 1.6

98 1.2 2.0

99 1.3 0.0 S

100 1.3 0.1

101 1.3 0.3

102 1.3 0.5

103 1.3 0.7

104 1.3 0.9

105 1.4 0.0 S

106 1.4 0.2

107 1.4 0.4

108 1.4 0.6

109 1.4 0.8

110 1.4 1.0

111 1.4 1.4

112 1.4 1.8

113 1.5 0.0 S

114 1.5 0.1

115 1.5 0.3

116 1.5 0.5

117 1.5 0.7

118 1.5 0.9

119 1.6 0.0 S

120 1.6 0.2

121	1.6	C.4	
122	1.6	0.6	
123	1.6	C.8	
124	1.6	1.0	
125	1.6	1.2	
126	1.6	1.6	
127	1.6	2.0	
128	1.8	C.C	S
129	1.8	0.2	
130	1.8	0.6	
131	1.8	1.C	
132	1.8	1.4	
133	1.8	1.8	
134	2.C	C.C	S
135	2.0	0.4	
136	2.0	0.8	
137	2.0	1.2	
138	2.0	1.6	
139	2.0	2.0	
14C	2.2	C.C	S
141	2.2	0.2	
142	2.2	0.6	
143	2.2	1.C	
144	2.2	1.4	
145	2.2	1.8	
146	2.4	C.C	S
147	2.4	0.4	
148	2.4	0.8	
149	2.4	1.2	
150	2.4	1.6	
151	2.4	2.C	
152	2.6	0.0	S
153	2.6	C.2	

154 2.6 C.6

155 2.6 1.0

156 2.6 1.4

157 2.6 1.8

158 2.8 C.C S

159 2.8 0.4

16C 2.8 C.8

161 2.8 1.2

162 2.8 1.6

163 2.8 2.C

164 3.0 0.0 S

165 3.0 0.2

166 3.0 C.6

167 3.C 1.C

168 3.C 1.4

169 3.0 1.8

17C 3.0 2.0

ELEMENT INCIDENCES

1	1	16	2
2	16	22	2
3	16	21	22
4	22	21	29
5	22	29	35
6	29	34	35
7	35	34	43
8	35	43	49
9	43	48	49
1C	49	48	56
11	49	56	62
12	56	61	62
13	62	61	70
14	62	7C	77
15	70	76	77

16	70	75	76
17	3	2	17
18	2	22	17
19	17	22	30
20	22	35	30
21	30	35	44
22	35	49	44
23	44	49	57
24	49	62	57
25	57	62	71
26	62	77	71
27	71	77	86
28	77	85	86
29	77	76	85
30	76	75	85
31	75	84	85
32	4	3	17
33	4	17	23
34	17	30	23
35	23	30	36
36	30	44	36
37	36	44	50
38	44	57	50
39	50	57	63
40	57	71	63
41	63	71	78
42	71	86	78
43	78	86	92
44	86	91	92
45	86	85	91
46	85	90	91
47	85	84	90
48	5	4	18

49	4	23	18
50	18	23	31
51	23	36	31
52	31	36	45
53	36	50	45
54	45	50	58
55	50	63	58
56	58	63	72
57	63	78	72
58	72	78	87
59	78	92	87
60	87	92	102
61	92	101	102
62	92	91	101
63	91	100	101
64	91	90	100
65	90	99	100
66	6	5	18
67	6	18	24
68	18	31	24
69	24	31	37
70	31	45	37
71	37	45	51
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74	58	72	64
75	64	72	79
76	72	87	79
77	79	87	93
78	93	87	102
79	93	102	108
80	102	107	108
81	102	101	107

82	101	106	107
83	101	100	106
84	100	105	106
85	100	99	105
86	7	6	19
87	6	24	19
88	19	24	32
89	24	37	32
90	32	37	46
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93	51	64	59
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95	64	79	73
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97	79	93	88
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107	105	113	114
108	8	7	19
109	8	19	25
110	19	32	25
111	25	32	38
112	32	46	38
113	38	46	52
114	46	59	52

115	52	59	65
116	59	73	65
117	65	73	80
118	73	88	80
119	80	88	94
120	94	88	103
121	94	103	109
122	109	103	117
123	9	8	20
124	8	25	20
125	20	25	33
126	25	38	33
127	33	38	47
128	38	52	47
129	47	52	60
130	52	65	60
131	60	65	74
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133	74	80	89
134	80	94	89
135	89	94	104
136	94	109	104
137	104	109	118
138	109	117	118
139	10	9	20
140	10	20	26
141	20	33	26
142	26	33	39
143	33	47	39
144	39	47	53
145	47	60	53
146	53	60	66
147	60	74	66

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148	66	74	81
149	74	89	81
150	81	89	95
151	95	89	104
152	95	104	110
153	104	118	110
154	110	118	124
155	118	123	124
156	118	117	123
157	117	122	123
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163	114	119	120
164	114	113	119
165	124	123	131
166	123	130	131
167	123	122	130
168	122	121	130
169	121	129	130
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174	11	10	26
175	11	26	40
176	26	39	40
177	40	39	53
178	40	53	67
179	53	66	67
180	67	66	81
181	67	81	96

182	81	95	96
183	96	95	110
184	96	110	125
185	110	124	125
186	125	124	131
187	125	131	137
188	131	136	137
189	131	130	136
190	130	135	136
191	130	129	135
192	129	134	135
193	129	128	134
194	12	11	27
195	11	40	27
196	27	40	54
197	40	67	54
198	54	67	82
199	67	96	82
200	82	96	111
201	96	125	111
202	111	125	132
203	125	137	132
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207	136	142	143
208	136	135	142
209	135	141	142
210	135	134	141
211	134	140	141
212	13	12	27
213	13	27	41
214	27	54	41

215	41	54	68
216	54	82	68
217	68	82	97
218	97	82	111
219	97	111	126
220	111	132	126
221	126	132	138
222	132	144	138
223	138	144	150
224	144	149	150
225	144	143	149
226	143	148	149
227	143	142	148
228	142	147	148
229	142	141	147
230	141	146	147
231	141	140	146
232	14	13	28
233	13	41	28
234	28	41	55
235	41	68	55
236	55	68	83
237	68	97	83
238	83	97	112
239	97	126	112
240	112	126	133
241	126	138	133
242	133	138	145
243	138	150	145
244	145	150	157
245	150	156	157
246	150	149	156
247	149	155	156

248	149	148	155
249	148	154	155
250	148	147	154
251	147	153	154
252	147	146	153
253	146	152	153
254	15	14	28
255	15	28	42
256	28	55	42
257	42	55	69
258	55	83	69
259	69	83	98
260	98	83	112
261	98	112	127
262	112	133	127
263	127	133	139
264	133	145	139
265	139	145	151
266	145	157	151
267	151	157	163
268	157	162	163
269	157	156	162
270	156	161	162
271	156	155	161
272	155	160	161
273	155	154	160
274	154	159	160
275	154	153	159
276	153	158	159
277	153	152	158
278	163	169	170
279	163	162	169
280	162	168	169

```
        281 162 161 168
        282 161 167 168
        283 161 160 167
        284 160 166 167
        285 160 159 166
        286 159 165 166
        287 159 158 165
        173 158 164 165
    ELEMENT PROPERTIES
        1 TO 287 TYPE 'CSTG' THICKNESS 0.20
        CONSTANTS
        E 30000. ALL
        POISSON .3 ALL
    JOINT RELEASES
        1 TO 15 FORCE Y
        75 84 90 99 105 113 119 128 134 140 146 152 158 164 FORCE X
    LOADING 'ONE' 'X=0.10'
    JOINT LOADS
        1 16 FORCE Y -10.
    LOADING 'TWO' 'X=0.20'
    JOINT LOADS
        1 21 FORCE Y -10.
        16 FORCE Y -20.
    LOADING 'THREE' 'X=0.30'
    JOINT LOADS
        1 29 FORCE Y -10.
        16 21 FORCE Y -20.
    LOADING 'FOUR' 'X=0.40'
    JOINT LOADS
        1 34 FORCE Y -10.
        16 21 29 FORCE Y -20.
    LOADING 'FIVE' 'X=0.50'
    JOINT LOADS
```

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        1 43 FORCE Y -10.
        16 21 29 34 FORCE Y -20.
    LOADING 'SIX' 'X=0.60'
    JOINT LOADS
        1 48 FORCE Y -10.
        16 21 29 34 43 FORCE Y -20.
    LOADING 'SEVEN' 'X=0.70'
    JOINT LOADS
        1 56 FORCE Y -10.
        16 21 29 34 43 48 FORCE Y -20.
    LOADING 'EIGHT' 'X=0.80'
    JOINT LOADS
        1 61 FORCE Y -10.
        16 21 29 34 43 48 56 FORCE Y -20.
    LOADING 'NINE' 'X=0.90'
    JOINT LOADS
        1 70 FORCE Y -10.
        16 21 29 34 43 48 56 61 FORCE Y -20.
    STIFFNESS ANALYSIS
    LIST DISPLACEMENTS STRESSES ALL
```

LOADING - ONE X=0.10

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0185230	
2	0.0	-0.0166612	
3	0.0	-0.0146869	
4	0.0	-0.0133945	
5	0.0	-0.0122791	
6	0.0	-0.0114776	
7	0.0	-0.0107484	
9	0.0	-0.0097098	
8	0.0	-0.0102054	
10	0.0	-0.0093475	
11	0.0	-0.0088387	
12	0.0	-0.0083743	
13	0.0	-0.0081298	
14	0.0	-0.0078257	
15	0.0	-0.0076729	
75	0.0037623	0.0	
84	0.0033174	0.0	
90	0.0031152	0.0	
99	0.0028728	0.0	
105	0.0027397	0.0	
113	0.0025931	0.0	
119	0.0025091	0.0	
128	0.0023517	0.0	
134	0.0022897	0.0	
140	0.0021620	0.0	
146	0.0021160	0.0	
152	0.0020134	0.0	
158	0.0019756	0.0	
164	0.0018512	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
16	0.0012313	-0.0162476	
17	-0.0002362	-0.0137128	
18	-0.0002592	-0.0118305	
19	-0.0002330	-0.0104825	
20	-0.0001980	-0.0095192	
21	0.0023128	-0.0128208	
22	0.0005709	-0.0127746	
23	-0.0003089	-0.0117733	
24	-0.0004105	-0.0105745	
25	-0.0003942	-0.0096140	
26	-0.0003544	-0.0088817	
27	-0.0003685	-0.0080599	

28	-0.0005453	-0.0076096
29	0.0027077	-0.0108633
30	0.0002573	-0.0108334
31	-0.0004012	-0.0102383
32	-0.0005243	-0.0094680
33	-0.0005148	-0.0088064
34	0.0029916	-0.0092648
35	0.0015571	-0.0092760
36	0.0000274	-0.0093159
37	-0.0004849	-0.0089627
38	-0.0006017	-0.0084946
39	-0.0005812	-0.0080864
40	-0.0006377	-0.0077892
41	-0.0008025	-0.0073069
42	-0.0014450	-0.0069690
43	0.0031787	-0.0079023
44	0.0009117	-0.0080075
45	-0.0001585	-0.0080513
46	-0.0005451	-0.0078908
47	-0.0006454	-0.0076549
48	0.0033389	-0.0066778
49	0.0019930	-0.0067089
50	0.0004644	-0.0068609
51	-0.0002837	-0.0069919
52	-0.0005740	-0.0069984
53	-0.0006979	-0.0069101
54	-0.0009155	-0.0067190
55	-0.0014457	-0.0064801
56	0.0034469	-0.0054150
57	0.0012530	-0.0055858
58	0.0001838	-0.0058727
59	-0.0003453	-0.0061311
60	-0.0005927	-0.0062471
61	0.0035101	-0.0041594
62	0.0021088	-0.0042466
63	0.0007865	-0.0046314
64	0.0000456	-0.0050971
65	-0.0003751	-0.0054353
66	-0.0006000	-0.0056232
67	-0.0008164	-0.0057260
68	-0.0013237	-0.0057325
69	-0.0024063	-0.0055829
70	0.0034500	-0.0025663
71	0.0014599	-0.0032800
72	0.0005619	-0.0039651
73	-0.0000228	-0.0044968
74	-0.0003972	-0.0048740
76	0.0029579	-0.0011066
77	0.0021931	-0.0017626
78	0.0011700	-0.0027786
79	0.0004382	-0.0034952
80	-0.0000682	-0.0040234
81	-0.0004387	-0.0044083
82	-0.0010615	-0.0047319
83	-0.0019478	-0.0047784
85	0.0029708	-0.0004887
86	0.0018473	-0.0015957
87	0.0009831	-0.0024854
88	0.0003480	-0.0031447
89	-0.0001201	-0.0036283
91	0.0024698	-0.0007042
92	0.0015725	-0.0015431
93	0.0008323	-0.0022857
94	0.0002582	-0.0028600
95	-0.0002042	-0.0032651
96	-0.0006102	-0.0035424

97	-0.0014781	-0.0038358
98	-0.0027820	-0.0038657
100	0.0027166	-0.0002369
101	0.0020991	-0.0008402
102	0.0013434	-0.0015100
103	0.0006912	-0.0021229
104	0.0001479	-0.0026086
106	0.0024009	-0.0004080
107	0.0018022	-0.0009209
108	0.0011404	-0.0014632
109	0.0005501	-0.0019706
110	0.0000185	-0.0023862
111	-0.0009394	-0.0028254
112	-0.0020566	-0.0030006
114	0.0025036	-0.0001561
115	0.0021222	-0.0005206
116	0.0015465	-0.0009527
117	0.0009500	-0.0013876
118	0.0003927	-0.0018040
120	0.0022877	-0.0002770
121	0.0018658	-0.0005778
122	0.0013152	-0.0009493
123	0.0007722	-0.0013000
124	0.0002001	-0.0016048
125	-0.0003157	-0.0018479
126	-0.0014037	-0.0021488
127	-0.0027045	-0.0022467
129	0.0022152	-0.0001645
130	0.0014250	-0.0005933
131	0.0003512	-0.0010727
132	-0.0007557	-0.0013640
133	-0.0019445	-0.0015110
135	0.0018487	-0.0001873
136	0.0009782	-0.0004577
137	-0.0001186	-0.0007091
138	-0.0012696	-0.0008587
139	-0.0024551	-0.0009387
141	0.0020452	-0.0000136
142	0.0014535	-0.0000849
143	0.0004916	-0.0002016
144	-0.0006319	-0.0002999
145	-0.0017914	-0.0003645
147	0.0017588	0.0000961
148	0.0010049	0.0001431
149	-0.0000333	0.0001458
150	-0.0011697	0.0001393
151	-0.0022605	0.0001091
153	0.0019206	0.0001260
154	0.0013933	0.0003428
155	0.0005029	0.0004907
156	-0.0005853	0.0005698
157	-0.0016994	0.0005961
159	0.0016514	0.0004098
160	0.0009482	0.0007392
161	-0.0000412	0.0009532
162	-0.0011408	0.0010561
163	-0.0022087	0.0010752
165	0.0017760	0.0003269
166	0.0012805	0.0008889
167	0.0004390	0.0012960
168	-0.0006034	0.0015169
169	-0.0016778	0.0015823
170	-0.0022046	0.0015865

LOADING - TWO X=0.20

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0326343	
2	0.0	-0.0307897	
3	0.0	-0.0279135	
4	0.0	-0.0259144	
5	0.0	-0.0239473	
6	0.0	-0.0225053	
7	0.0	-0.0211432	
9	0.0	-0.0191726	
8	0.0	-0.0201205	
10	0.0	-0.0184778	
11	0.0	-0.0174939	
12	0.0	-0.0165870	
13	0.0	-0.0161100	
14	0.0	-0.0155112	
15	0.0	-0.0152098	
75	0.0075018	0.0	
84	0.0066090	0.0	
90	0.0062031	0.0	
99	0.0057173	0.0	
105	0.0054506	0.0	
113	0.0051573	0.0	
119	0.0049893	0.0	
128	0.0046751	0.0	
134	0.0045515	0.0	
140	0.0042973	0.0	
146	0.0042060	0.0	
152	0.0040020	0.0	
158	0.0039271	0.0	
164	0.0036801	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
16	0.0022795	-0.0312047	
17	-0.0001187	-0.0266604	
18	-0.0004077	-0.0231971	
19	-0.0004205	-0.0206582	
20	-0.0003740	-0.0188111	
21	0.0042520	-0.0269092	
22	0.0012127	-0.0258665	
23	-0.0004228	-0.0232197	
24	-0.0007237	-0.0208635	
25	-0.0007384	-0.0190020	
26	-0.0006814	-0.0175782	
27	-0.0007234	-0.0159729	
28	-0.0010775	-0.0150863	
29	0.0051342	-0.0222131	
30	0.0005103	-0.0218212	
31	-0.0006917	-0.0203114	
32	-0.0009747	-0.0187453	
33	-0.0009854	-0.0174393	
34	0.0058749	-0.0187645	

35	0.0030090	-0.0187906
36	0.0000488	-0.0187037
37	-0.0009056	-0.0178245
38	-0.0011501	-0.0168508
39	-0.0011282	-0.0160329
40	-0.0012473	-0.0154439
41	-0.0015845	-0.0144907
42	-0.0028563	-0.0138221
43	0.0063057	-0.0159644
44	0.0017535	-0.0161393
45	-0.0003208	-0.0161272
46	-0.0010514	-0.0157069
47	-0.0012531	-0.0152005
48	0.0066489	-0.0134426
49	0.0039229	-0.0135011
50	0.0008809	-0.0137817
51	-0.0005703	-0.0139806
52	-0.0011238	-0.0139330
53	-0.0013675	-0.0137283
54	-0.0018058	-0.0133344
55	-0.0028599	-0.0128583
56	0.0068708	-0.0108787
57	0.0024516	-0.0112155
58	0.0003342	-0.0117681
59	-0.0006929	-0.0122429
60	-0.0011690	-0.0124363
61	0.0069984	-0.0083443
62	0.0041755	-0.0085160
63	0.0015292	-0.0092820
64	0.0000674	-0.0101951
65	-0.0007517	-0.0108425
66	-0.0011870	-0.0111931
67	-0.0016143	-0.0113841
68	-0.0026200	-0.0113837
69	-0.0047628	-0.0110845
70	0.0068777	-0.0051417
71	0.0028788	-0.0065691
72	0.0010894	-0.0079339
73	-0.0000629	-0.0089819
74	-0.0007947	-0.0097156
76	0.0058885	-0.0022145
77	0.0043524	-0.0035261
78	0.0023037	-0.0055578
79	0.0008495	-0.0069845
80	-0.0001489	-0.0080281
81	-0.0008763	-0.0087816
82	-0.0021048	-0.0094095
83	-0.0038594	-0.0094949
85	0.0059136	-0.0009756
86	0.0036612	-0.0031886
87	0.0019353	-0.0049657
88	0.0006750	-0.0062778
89	-0.0002489	-0.0072344
91	0.0049097	-0.0014049
92	0.0031140	-0.0030809
93	0.0016387	-0.0045629
94	0.0005003	-0.0057053
95	-0.0004130	-0.0065080
96	-0.0012155	-0.0070550
97	-0.0029324	-0.0076305
98	-0.0055150	-0.0076864
100	0.0054043	-0.0004719
101	0.0041685	-0.0016757
102	0.0026590	-0.0030132
103	0.0013612	-0.0042355
104	0.0002841	-0.0052018

106	0.0047727	-0.0008129
107	0.0035764	-0.0018365
108	0.0022567	-0.0029187
109	0.0010835	-0.0039303
110	0.0000292	-0.0047571
111	-0.0018675	-0.0056276
112	-0.0040809	-0.0059726
114	0.0049783	-0.0003108
115	0.0042162	-0.0010375
116	0.0030674	-0.0018998
117	0.0018797	-0.0027676
118	0.0007729	-0.0035975
120	0.0045471	-0.0005519
121	0.0037054	-0.0011519
122	0.0026079	-0.0018934
123	0.0015280	-0.0025929
124	0.0003918	-0.0032004
125	-0.0006313	-0.0036843
126	-0.0027882	-0.0042821
127	-0.0053691	-0.0044750
129	0.0044028	-0.0003279
130	0.0028284	-0.0011839
131	0.0006936	-0.0021409
132	-0.0015031	-0.0027215
133	-0.0038624	-0.0030137
135	0.0036731	-0.0003743
136	0.0019412	-0.0009153
137	-0.0002380	-0.0014178
138	-0.0025232	-0.0017163
139	-0.0048785	-0.0018750
141	0.0040648	-0.0000278
142	0.0028876	-0.0001719
143	0.0009752	-0.0004066
144	-0.0012567	-0.0006039
145	-0.0035602	-0.0007327
147	0.0034953	0.0001893
148	0.0019964	0.0002805
149	-0.0000670	0.0002839
150	-0.0023252	0.0002699
151	-0.0044938	0.0002098
153	0.0038175	0.0002497
154	0.0027690	0.0006789
155	0.0009990	0.0009710
156	-0.0011637	0.0011271
157	-0.0033782	0.0011789
159	0.0032825	0.0008131
160	0.0018845	0.0014661
161	-0.0000822	0.0018901
162	-0.0022679	0.0020939
163	-0.0043911	0.0021318
165	0.0035304	0.0006490
166	0.0025453	0.0017646
167	0.0008725	0.0025723
168	-0.0011994	0.0030104
169	-0.0033354	0.0031402
170	-0.0043828	0.0031485

LOADING - THREE X=0.30

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT /------------------DISPLACEMENT------------------/

	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0442600	
2	C.C	-0.0424244	
3	C.0	-0.0394522	
4	C.0	-0.0372255	
5	0.0	-C.C347C8C	
6	0.0	-0.0328186	
7	C.C	-C.03C9551	
9	0.0	-0.0282072	
8	C.C	-0.0295421	
1C	C.C	-0.0272251	
11	0.0	-0.0258197	
12	C.C	-0.0245C68	
13	0.0	-0.0238168	
14	0.0	-0.0229396	
15	C.0	-0.0224971	
75	0.0111974	0.0	
84	C.CC98506	0.0	
90	0.0092380	C.0	
99	0.0085070	0.0	
105	0.0081058	0.0	
113	0.0076657	0.0	
119	C.C074136	C.0	
128	0.0069442	0.0	
134	0.0067596	0.0	
140	C.0063815	0.0	
146	0.0062458	0.0	
152	0.0059431	0.0	
158	0.0058324	0.0	
164	0.0054659	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JCINTS

JOINT	/------------------DISPLACEMENT	------------------/	
	X DISP.	Y DISP.	Z DISP.
16	0.0028162	-0.0432631	
17	0.0002781	-0.0383869	
18	-0.0004267	-0.0338105	
19	-0.0005451	-0.0303114	
20	-0.0005171	-C.C277030	
21	0.0053347	-0.0402890	
22	0.0021635	-0.0382726	
23	-C.C002872	-C.034C157	
24	-0.0009006	-0.0306455	
25	-C.0010071	-C.C279882	
26	-0.0009649	-0.0259410	
27	-0.0010549	-0.0236167	
28	-C.CC15861	-0.0223186	
29	0.0070118	-0.0348887	
3C	C.0009536	-0.0326077	
31	-0.0008024	-0.03CC110	
32	-0.0013096	-0.0276646	
33	-0.0013849	-C.0257542	
34	0.0085743	-0.0288568	
35	C.0041783	-0.0288746	
36	0.0001652	-0.0280215	
37	-0.0012068	-0.0264474	
38	-C.CC16090	-0.0249392	
39	-0.0016175	-0.0237183	
4C	-0.0018091	-C.0228494	
41	-0.0023298	-0.0214471	

42	-0.0042072	-0.0204609
43	0.0093440	-0.0243863
44	0.0024426	-0.0245553
45	-0.0004374	-0.0241586
46	-0.0014796	-0.0233500
47	-0.0017939	-0.0225324
48	0.0099094	-0.0203998
49	0.0057120	-0.0204742
50	0.0012068	-0.0208332
51	-0.0008350	-0.0209209
52	-0.0016222	-0.0207274
53	-0.0019851	-0.0203672
54	-0.0026512	-0.0197562
55	-0.0042171	-0.0190469
56	0.0102528	-0.0164454
57	0.0035370	-0.0169404
58	0.0004265	-0.0177108
59	-0.0010300	-0.0182971
60	-0.0017100	-0.0185037
61	0.0104455	-0.0125834
62	0.0061552	-0.0128336
63	0.0021862	-0.0139746
64	0.0000494	-0.0152946
65	-0.0011228	-0.0161851
66	-0.0017471	-0.0166547
67	-0.0023765	-0.0169096
68	-0.0038659	-0.0168818
69	-0.0070286	-0.0164335
70	0.0102625	-0.0077362
71	0.0042154	-0.0098783
72	0.0015521	-0.0119118
73	-0.0001313	-0.0134430
74	-0.0011874	-0.0144890
76	0.0087657	-0.0033251
77	0.0064444	-0.0052924
78	0.0033670	-0.0083396
79	0.0012113	-0.0104629
80	-0.0002497	-0.0119952
81	-0.0013086	-0.0130844
82	-0.0031133	-0.0139817
83	-0.0057039	-0.0140939
85	0.0088018	-0.0014590
86	0.0054094	-0.0047768
87	0.0028287	-0.0074372
88	0.0009640	-0.0093883
89	-0.0003915	-0.0107963
91	0.0072911	-0.0020990
92	0.0045955	-0.0046090
93	0.0023968	-0.0068241
94	0.0007135	-0.0085219
95	-0.0006284	-0.0097064
96	-0.0018102	-0.0105085
97	-0.0043419	-0.0113453
98	-0.0081573	-0.0114205
100	0.0080359	-0.0007032
101	0.0061803	-0.0025024
102	0.0039217	-0.0045035
103	0.0019920	-0.0063281
104	0.0003999	-0.0077646
106	0.0070884	-0.0012119
107	0.0052968	-0.0027419
108	0.0033274	-0.0043596
109	0.0015861	-0.0058689
110	0.0000264	-0.0070974
111	-0.0027738	-0.0083833
112	-0.0060445	-0.0088883

114	0.0073971	-0.0004629
115	0.0062563	-0.0015474
116	0.0045398	-0.0028363
117	0.0027713	-0.0041326
118	0.0011299	-0.0053701
120	0.0067521	-0.0008230
121	0.0054946	-0.0017188
122	0.0038578	-0.0028270
123	0.0022532	-0.0038720
124	0.0005682	-0.0047775
125	-0.0009460	-0.0054975
126	-0.0041363	-0.0063840
127	-0.0079586	-0.0066666
129	0.0065372	-0.0004891
130	0.0041906	-0.0017691
131	0.0010196	-0.0031997
132	-0.0022347	-0.0040654
133	-0.0057297	-0.0044991
135	0.0054509	-0.0005608
136	0.0028755	-0.0013720
137	-0.0003587	-0.0021247
138	-0.0037463	-0.0025706
139	-0.0072419	-0.0028054
141	0.0060351	-0.0000433
142	0.0042845	-0.0002626
143	0.0014437	-0.0006173
144	-0.0018683	-0.0009148
145	-0.0052861	-0.0011071
147	0.0051892	0.0002770
148	0.0029619	0.0004076
149	-0.0001018	0.0004081
150	-0.0034536	0.0003848
151	-0.0066750	0.0002955
153	0.0056688	0.0003689
154	0.0041107	0.0010023
155	0.0014820	0.0014321
156	-0.0017291	0.0016608
157	-0.0050178	0.0017368
159	0.0048745	0.0012040
160	0.0027978	0.0021700
161	-0.0001229	0.0027965
162	-0.0033688	0.0030973
163	-0.0065230	0.0031535
165	0.0052435	0.0009622
166	0.0037800	0.0026155
167	0.0012953	0.0038115
168	-0.0017817	0.0044597
169	-0.0049546	0.0046518
170	-0.0065107	0.0046641

LOADING - FOUR X=0.40

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/----------DISPLACEMENT----------		----------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0542105	
2	0.0	-0.0523738	
3	0.0	-0.0494680	
4	0.0	-0.0471702	
5	0.0	-0.0443765	

6	0.0	-0.0422244
7	0.0	-0.0400039
9	0.0	-0.0366561
8	0.0	-0.0383010
10	0.0	-0.0354410
11	0.0	-0.0336806
12	0.0	-0.0320086
13	0.0	-0.0311310
14	0.0	-0.0299976
15	0.0	-0.0294242
75	0.0148169	0.0
84	0.0130088	0.0
90	0.0121867	0.0
99	0.0112091	0.0
105	0.0106729	0.0
113	0.0100868	0.0
119	0.0097511	0.0
128	0.0091293	0.0
134	0.0088851	0.0
140	0.0083870	0.0
146	0.0082087	0.0
152	0.0078112	0.0
158	0.0076664	0.0
164	0.0071854	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----DISPLACEMENT-----		/
	X DISP.	Y DISP.	Z DISP.
16	0.0030787	-0.0534407	
17	0.0006697	-0.0485993	
18	-0.0003336	-0.0434599	
19	-0.0006022	-0.0392643	
20	-0.0006214	-0.0360420	
21	0.0059713	-0.0509610	
22	0.0030772	-0.0489535	
23	0.0000567	-0.0439011	
24	-0.0009336	-0.0397345	
25	-0.0011884	-0.0364162	
26	-0.0011950	-0.0338332	
27	-0.0013556	-0.0308736	
28	-0.0020618	-0.0291974	
29	0.0084659	-0.0469846	
30	0.0016702	-0.0427972	
31	-0.0007144	-0.0391395	
32	-0.0015101	-0.0360705	
33	-0.0016976	-0.0336154	
34	0.0108211	-0.0404661	
35	0.0052399	-0.0394654	
36	0.0004481	-0.0370647	
37	-0.0013586	-0.0346837	
38	-0.0019566	-0.0326307	
39	-0.0020330	-0.0310235	
40	-0.0023084	-0.0298933	
41	-0.0030243	-0.0280727	
42	-0.0054734	-0.0267877	
43	0.0120226	-0.0334247	
44	0.0030167	-0.0332150	
45	-0.0004623	-0.0320227	
46	-0.0018024	-0.0307061	
47	-0.0022473	-0.0295416	
48	0.0129952	-0.0276488	

49	0.0072914	-0.0277348
50	0.0014550	-0.0279870
51	-0.0010494	-0.0277283
52	-0.0020472	-0.0272898
53	-0.0025323	-0.0267338
54	-0.0034345	-0.0258923
55	-0.0054938	-0.0249572
56	0.0135200	-0.0221899
57	0.0044663	-0.0228060
58	0.0004645	-0.0236734
59	-0.0013391	-0.0242281
60	-0.0021985	-0.0243727
61	0.0138031	-0.0169103
62	0.0079931	-0.0172331
63	0.0027280	-0.0187224
64	-0.0000085	-0.0203659
65	-0.0014768	-0.0214075
66	-0.0022665	-0.0219413
67	-0.0030875	-0.0222308
68	-0.0050402	-0.0221517
69	-0.0091655	-0.0215564
70	0.0135655	-0.0103656
71	0.0054277	-0.0132204
72	0.0019287	-0.0158947
73	-0.0002296	-0.0178490
74	-0.0015672	-0.0191444
76	0.0115516	-0.0044422
77	0.0084285	-0.0070654
78	0.0043272	-0.0111241
79	0.0015076	-0.0139168
80	-0.0003724	-0.0158931
81	-0.0017286	-0.0172706
82	-0.0040705	-0.0183915
83	-0.0074518	-0.0185152
85	0.0116001	-0.0019381
86	0.0070568	-0.0063586
87	0.0036378	-0.0098926
88	0.0012025	-0.0124577
89	-0.0005492	-0.0142824
91	0.0095802	-0.0027839
92	0.0059869	-0.0061220
93	0.0030861	-0.0090577
94	0.0008883	-0.0112890
95	-0.0008500	-0.0128309
96	-0.0023868	-0.0138665
97	-0.0056853	-0.0149358
98	-0.0106679	-0.0150219
100	0.0105786	-0.0009291
101	0.0081037	-0.0033162
102	0.0051060	-0.0059728
103	0.0025672	-0.0083870
104	0.0004888	-0.0102760
106	0.0093167	-0.0016022
107	0.0069357	-0.0036317
108	0.0043314	-0.0057765
109	0.0020454	-0.0077719
110	0.0000061	-0.0093867
111	-0.0036465	-0.0110640
112	-0.0079189	-0.0117151
114	0.0097289	-0.0006111
115	0.0082133	-0.0020466
116	0.0059392	-0.0037559
117	0.0036074	-0.0054728
118	0.0014546	-0.0071075
120	0.0088731	-0.0010881
121	0.0072073	-0.0022743

122	0.0050441	-0.0037437
123	0.0029338	-0.0051277
124	0.0007233	-0.0063233
125	-0.0012580	-0.0072716
126	-0.0054299	-0.0084338
127	-0.0104364	-0.0087987
129	0.0035900	-0.0006470
130	0.0054907	-0.0023453
131	0.0013220	-0.0042414
132	-0.0029419	-0.0053848
133	-0.0075215	-0.0059541
135	0.0071578	-0.0007459
136	0.0037666	-0.0018258
137	-0.0004812	-0.0028260
138	-0.0049234	-0.0034164
139	-0.0095144	-0.0037235
141	0.0079300	-0.0000603
142	0.0056247	-0.0003581
143	0.0018893	-0.0008350
144	-0.0024597	-0.0012334
145	-0.0069472	-0.0014880
147	0.0068176	0.0003570
148	0.0038880	0.0005202
149	-0.0001383	0.0005129
150	-0.0045411	0.0004781
151	-0.0087771	0.0003605
153	0.0074501	0.0004818
154	0.0054006	0.0013073
155	0.0019446	0.0018652
156	-0.0022752	0.0021606
157	-0.0065977	0.0022588
159	0.0064064	0.0015764
160	0.0036756	0.0028398
161	-0.0001635	0.0036578
162	-0.0044301	0.0040501
163	-0.0085780	0.0041236
165	0.0068928	0.0012620
166	0.0049681	0.0034291
167	0.0017015	0.0049951
168	-0.0023434	0.0058431
169	-0.0065155	0.0060945
170	-0.0085620	0.0061105

LOADING - FIVE X=0.50

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------	DISPLACEMENT	-----------------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0627331	
2	0.0	-0.0609151	
3	0.0	-0.0580746	
4	0.0	-0.0557599	
5	0.0	-0.0528791	
6	0.0	-0.0506021	
7	0.0	-0.0481533	
9	0.0	-0.0443764	
8	0.0	-0.0462534	
10	0.0	-0.0429839	
11	0.0	-0.0409405	
12	0.0	-0.0389633	

13	0.0	-0.0379271
14	0.0	-0.0365647
15	0.0	-0.0358733
75	0.0183409	0.0
84	0.0160571	0.0
90	0.0150195	0.0
99	0.0137924	0.0
105	0.0131200	0.0
113	0.0123885	0.0
119	0.0119697	0.0
128	0.0111994	0.0
134	0.0108971	0.0
140	0.0102843	0.0
146	0.0100657	0.0
152	0.0095787	0.0
158	0.0094023	0.0
164	0.0088135	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-------------------DISPLACEMENT	-------------------/	
	X DISP.	Y DISP.	Z DISP.
16	0.0032834	-0.0620850	
17	0.0009768	-0.0573232	
18	-0.0001749	-0.0520165	
19	-0.0006027	-0.0473689	
20	-0.0006881	-0.0436840	
21	0.0064373	-0.0598785	
22	0.0037247	-0.0579043	
23	0.0005044	-0.0526868	
24	-0.0008512	-0.0479671	
25	-0.0012864	-0.0441369	
26	-0.0013686	-0.0411167	
27	-0.0016197	-0.0376189	
28	-0.0024957	-0.0356060	
29	0.0093817	-0.0565815	
30	0.0025217	-0.0519957	
31	-0.0004665	-0.0474871	
32	-0.0015836	-0.0438033	
33	-0.0019199	-0.0408824	
34	0.0121951	-0.0515169	
35	0.0064921	-0.0494791	
36	0.0009027	-0.0455281	
37	-0.0013603	-0.0423520	
38	-0.0021870	-0.0397818	
39	-0.0023658	-0.0378200	
40	-0.0027348	-0.0364546	
41	-0.0036549	-0.0342561	
42	-0.0066311	-0.0326968	
43	0.0141061	-0.0438798	
44	0.0036775	-0.0417008	
45	-0.0003580	-0.0395130	
46	-0.0020039	-0.0376279	
47	-0.0026012	-0.0361029	
48	0.0158482	-0.0354941	
49	0.0085038	-0.0355423	
50	0.0017226	-0.0350602	
51	-0.0011787	-0.0342612	
52	-0.0023802	-0.0335009	
53	-0.0029943	-0.0327192	
54	-0.0041399	-0.0316412	
55	-0.0066662	-0.0304920	

56	0.0166393	-0.0282654
57	0.0051669	-0.0289256
58	0.0004923	-0.0295600
59	-0.0015941	-0.0299328
60	-0.0026168	-0.0299447
61	0.0170498	-0.0213993
62	0.0096138	-0.0217799
63	0.0031156	-0.0235655
64	-0.0000864	-0.0253465
65	-0.0017954	-0.0264292
66	-0.0027305	-0.0269694
67	-0.0037310	-0.0272629
68	-0.0061209	-0.0271088
69	-0.0111342	-0.0263708
70	0.0167659	-0.0130572
71	0.0064596	-0.0166227
72	0.0021954	-0.0198871
73	-0.0003489	-0.0221503
74	-0.0019209	-0.0236145
76	0.0142148	-0.0055715
77	0.0102582	-0.0088522
78	0.0051444	-0.0139176
79	0.0017221	-0.0173335
80	-0.0005131	-0.0196774
81	-0.0021259	-0.0212814
82	-0.0049583	-0.0225717
83	-0.0090719	-0.0226904
85	0.0142768	-0.0024105
86	0.0085623	-0.0079331
87	0.0043333	-0.0123259
88	0.0013790	-0.0154648
89	-0.0007195	-0.0176523
91	0.0117425	-0.0034554
92	0.0072542	-0.0076138
93	0.0036844	-0.0112510
94	0.0010165	-0.0139821
95	-0.0010747	-0.0158443
96	-0.0029354	-0.0170840
97	-0.0069394	-0.0183495
98	-0.0130027	-0.0184368
100	0.0130002	-0.0011469
101	0.0099055	-0.0041109
102	0.0061840	-0.0074119
103	0.0030699	-0.0103960
104	0.0005452	-0.0127106
106	0.0114256	-0.0019796
107	0.0084632	-0.0044986
108	0.0052457	-0.0071580
109	0.0024483	-0.0096217
110	-0.0000345	-0.0115996
111	-0.0044717	-0.0136343
112	-0.0096724	-0.0144133
114	0.0119417	-0.0007534
115	0.0100570	-0.0025300
116	0.0072395	-0.0046505
117	0.0043692	-0.0067759
118	0.0017376	-0.0087920
120	0.0108792	-0.0013443
121	0.0088156	-0.0028129
122	0.0061442	-0.0046348
123	0.0035550	-0.0063479
124	0.0008516	-0.0078217
125	-0.0015644	-0.0089866
126	-0.0066485	-0.0104059
127	-0.0127618	-0.0108432
129	0.0105308	-0.0007997

130	0.0067066	-0.0029069
131	0.0015934	-0.0052561
132	-0.0036150	-0.0066656
133	-0.0092095	-0.0073621
135	0.0037675	-0.0009281
136	0.0045989	-0.0022735
137	-0.0006050	-0.0035162
138	-0.0060368	-0.0042460
139	-0.0116610	-0.0046203
141	0.0097212	-0.0000791
142	0.0068873	-0.0004587
143	0.0023039	-0.0010598
144	-0.0030227	-0.0015594
145	-0.0085183	-0.0018743
147	0.0083561	0.0004271
148	0.0047598	0.0006143
149	-0.0001768	0.0005935
150	-0.0055717	0.0005445
151	-0.0107688	0.0004001
153	0.0091350	0.0005860
154	0.0066189	0.0015880
155	0.0023794	0.0022614
156	-0.0027942	0.0026157
157	-0.0080947	0.0027336
159	0.0078553	0.0019240
160	0.0045046	0.0034637
161	-0.0002039	0.0044585
162	-0.0054363	0.0049350
163	-0.0105260	0.0050247
165	0.0084541	0.0015436
166	0.0060919	0.0041921
167	0.0020846	0.0061036
168	-0.0028763	0.0071373
169	-0.0079950	0.0074438
170	-0.0105064	0.0074634

LOADING - SIX X=0.60

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/--------DISPLACEMENT--------		/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0699904	
2	0.0	-0.0681953	
3	0.0	-0.0654193	
4	0.0	-0.0631169	
5	0.0	-0.0602154	
6	0.0	-0.0578800	
7	0.0	-0.0552992	
9	0.0	-0.0512377	
8	0.0	-0.0532765	
10	0.0	-0.0497193	
11	0.0	-0.0474639	
12	0.0	-0.0452388	
13	0.0	-0.0440747	
14	0.0	-0.0425145	
15	0.0	-0.0417200	
75	0.0217112	0.0	
84	0.0189400	0.0	
90	0.0176840	0.0	
99	0.0162080	0.0	

105	0.0154004	0.0
113	0.0145265	0.0
119	0.0140265	0.0
128	0.0131141	0.0
134	0.0127564	0.0
140	0.0120365	0.0
146	0.0117805	0.0
152	0.0112111	0.0
158	0.0110061	0.0
164	0.0103182	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT	------------------/	
	X DISP.	Y DISP.	Z DISP.
16	0.0034369	-0.0694078	
17	0.0012230	-0.0647427	
18	-0.0000157	-0.0594064	
19	-0.0005670	-0.0545017	
20	-0.0007227	-0.0504940	
21	0.0067624	-0.0673825	
22	0.0042194	-0.0654364	
23	0.0009184	-0.0602267	
24	-0.0007040	-0.0552046	
25	-0.0013167	-0.0510117	
26	-0.0014888	-0.0476556	
27	-0.0018433	-0.0437231	
28	-0.0028796	-0.0414207	
29	0.0099444	-0.0644566	
30	0.0032731	-0.0598218	
31	-0.0001312	-0.0548555	
32	-0.0015567	-0.0507095	
33	-0.0020588	-0.0474155	
34	0.0130764	-0.0599291	
35	0.0076386	-0.0578631	
36	0.0014793	-0.0531006	
37	-0.0012365	-0.0492646	
38	-0.0023089	-0.0462439	
39	-0.0026151	-0.0439734	
40	-0.0030835	-0.0424052	
41	-0.0042099	-0.0398775	
42	-0.0076579	-0.0380738	
43	0.0157461	-0.0537681	
44	0.0045175	-0.0495739	
45	-0.0001181	-0.0463970	
46	-0.0020859	-0.0439518	
47	-0.0028537	-0.0420795	
48	0.0182209	-0.0448141	
49	0.0095473	-0.0437607	
50	0.0020806	-0.0418079	
51	-0.0012035	-0.0403449	
52	-0.0026126	-0.0392211	
53	-0.0033633	-0.0382010	
54	-0.0047547	-0.0368904	
55	-0.0077118	-0.0355439	
56	0.0193392	-0.0349122	
57	0.0056899	-0.0352078	
58	0.0005532	-0.0352151	
59	-0.0017756	-0.0352759	
60	-0.0029529	-0.0351005	
61	0.0200518	-0.0261211	
62	0.0109547	-0.0265450	

63	0.0033676	-0.0284381
64	-0.0001587	-0.0301258
65	-0.0020619	-0.0311411
66	-0.0031268	-0.0316346
67	-0.0042933	-0.0319049
68	-0.0070870	-0.0316566
69	-0.0128964	-0.0307834
70	0.0107736	-0.0158581
71	0.0072723	-0.0201019
72	0.0023581	-0.0238337
73	-0.0004737	-0.0262606
74	-0.0022348	-0.0278077
76	0.0166870	-0.0067254
77	0.0118772	-0.0106644
78	0.0057912	-0.0167107
79	0.0018555	-0.0206626
80	-0.0006617	-0.0232764
81	-0.0024884	-0.0250377
82	-0.0057582	-0.0264406
83	-0.0105322	-0.0265386
85	0.0167753	-0.0028774
86	0.0098830	-0.0094963
87	0.0048945	-0.0147158
88	0.0014918	-0.0183628
89	-0.0008954	-0.0208433
91	0.0137305	-0.0041104
92	0.0083638	-0.0090724
93	0.0041757	-0.0133772
94	0.0010959	-0.0165570
95	-0.0012963	-0.0186913
96	-0.0034438	-0.0200999
97	-0.0080790	-0.0215204
98	-0.0151158	-0.0215994
100	0.0152533	-0.0013548
101	0.0115457	-0.0048795
102	0.0071288	-0.0088041
103	0.0034872	-0.0123264
104	0.0005681	-0.0150272
106	0.0133725	-0.0023399
107	0.0098453	-0.0053323
108	0.0060484	-0.0084852
109	0.0027848	-0.0113894
110	-0.0000949	-0.0136975
111	-0.0052330	-0.0160460
112	-0.0112706	-0.0169315
114	0.0139923	-0.0008880
115	0.0117494	-0.0029914
116	0.0084121	-0.0055077
117	0.0050390	-0.0080222
118	0.0019716	-0.0103961
120	0.0127306	-0.0015880
121	0.0102861	-0.0033270
122	0.0071340	-0.0054871
123	0.0041025	-0.0075134
124	0.0009494	-0.0092476
125	-0.0018597	-0.0106123
126	-0.0077684	-0.0122636
127	-0.0148892	-0.0127617
129	0.0123216	-0.0009449
130	0.0078126	-0.0034456
131	0.0018270	-0.0062270
132	-0.0042414	-0.0078854
133	-0.0107608	-0.0086975
135	0.0102478	-0.0011048
136	0.0053550	-0.0027084
137	-0.0007289	-0.0041840

138	-0.0070656	-0.0050457
139	-0.0136404	-0.0054804
141	0.0113736	-0.0000996
142	0.0080467	-0.0005635
143	0.0026784	-0.0012892
144	-0.0035474	-0.0018885
145	-0.0099696	-0.0022604
147	0.0097743	0.0004854
148	0.0055597	0.0006869
149	-0.0002175	0.0006465
150	-0.0065263	0.0005807
151	-0.0126124	0.0004115
153	0.0106904	0.0006795
154	0.0077415	0.0018381
155	0.0027771	0.0026118
156	-0.0032768	0.0030158
157	-0.0094805	0.0031503
159	0.0091928	0.0022396
160	0.0052680	0.0040288
161	-0.0002439	0.0051819
162	-0.0063686	0.0057333
163	-0.0123300	0.0058377
165	0.0098969	0.0018013
166	0.0071293	0.0048894
167	0.0024367	0.0071144
168	-0.0033710	0.0083158
169	-0.0093654	0.0086721
170	-0.0123072	0.0086949

LOADING - SEVEN X=0.70

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------DISPLACEMENT	-----------------/	
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0760185	
2	0.0	-0.0742505	
3	0.0	-0.0715247	
4	0.0	-0.0692428	
5	0.0	-0.0663422	
6	0.0	-0.0639834	
7	0.0	-0.0613372	
9	0.0	-0.0571042	
8	0.0	-0.0592464	
10	0.0	-0.0555038	
11	0.0	-0.0531008	
12	0.0	-0.0506851	
13	0.0	-0.0494236	
14	0.0	-0.0477002	
15	0.0	-0.0468193	
75	0.0249012	0.0	
84	0.0216154	0.0	
90	0.0201319	0.0	
99	0.0184061	0.0	
105	0.0174638	0.0	
113	0.0164513	0.0	
119	0.0158725	0.0	
128	0.0148263	0.0	
134	0.0144164	0.0	
140	0.0135989	0.0	
146	0.0133093	0.0	

152	0.0126665	0.0
158	0.0124366	0.0
164	0.0116611	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
16	0.0035701	-0.0754725	
17	0.0014093	-0.0708904	
18	0.0001199	-0.0655684	
19	-0.0005135	-0.0605435	
20	-0.0007333	-0.0563301	
21	0.0070387	-0.0735463	
22	0.0045884	-0.0716314	
23	0.0012520	-0.0664625	
24	-0.0005341	-0.0613211	
25	-0.0013001	-0.0568961	
26	-0.0015631	-0.0532999	
27	-0.0020244	-0.0490363	
28	-0.0032052	-0.0464967	
29	0.0103963	-0.0708166	
30	0.0038476	-0.0661996	
31	0.0002212	-0.0610848	
32	-0.0014654	-0.0566305	
33	-0.0021292	-0.0530598	
34	0.0137465	-0.0665627	
35	0.0084584	-0.0645152	
36	0.0020758	-0.0595374	
37	-0.0010346	-0.0552286	
38	-0.0023440	-0.0518501	
39	-0.0027870	-0.0493287	
40	-0.0033537	-0.0475958	
41	-0.0046779	-0.0447955	
42	-0.0085309	-0.0427830	
43	0.0168166	-0.0610552	
44	0.0054170	-0.0563949	
45	0.0002138	-0.0524192	
46	-0.0020694	-0.0494881	
47	-0.0030132	-0.0473098	
48	0.0196734	-0.0534937	
49	0.0107453	-0.0512990	
50	0.0025348	-0.0478789	
51	-0.0011303	-0.0457577	
52	-0.0027483	-0.0442774	
53	-0.0036380	-0.0430288	
54	-0.0052670	-0.0415040	
55	-0.0086063	-0.0399835	
56	0.0213758	-0.0429305	
57	0.0062328	-0.0411895	
58	0.0006810	-0.0403878	
59	-0.0018741	-0.0400741	
60	-0.0032008	-0.0396865	
61	0.0227431	-0.0313322	
62	0.0118587	-0.0317091	
63	0.0035774	-0.0331105	
64	-0.0001942	-0.0345228	
65	-0.0022619	-0.0353916	
66	-0.0034455	-0.0358011	
67	-0.0047612	-0.0360284	
68	-0.0079154	-0.0356759	
69	-0.0144100	-0.0346796	

70	0.0225387	-0.0188639
71	0.0077938	-0.0237141
72	C.C02459C	-0.0275978
73	-0.0005807	-0.0300431
74	-0.0024942	-0.0315964
76	0.0189078	-0.0079244
77	0.0132005	-0.0125230
78	0.0062288	-0.0195015
79	0.0019265	-0.0238077
8C	-C.0008018	-0.0265807
81	-0.0028015	-0.0284307
82	-0.0064494	-0.0298929
83	-0.0117968	-0.0299577
85	C.0190404	-0.0033346
86	0.0109577	-0.0110445
87	0.0052975	-0.0170352
88	0.0015493	-0.0210741
89	-0.0010643	-0.0237643
91	0.0154897	-0.0047404
92	0.0092718	-C.0104810
93	0.0045432	-0.0153991
94	0.0011306	-0.0189469
95	-0.0015045	-0.0212932
96	-0.0038958	-0.0228307
97	-C.0090745	-C.0243627
98	-0.0169539	-0.0244251
1CC	0.0172868	-0.0015474
101	C.0129763	-0.0056095
102	0.0079076	-0.0101257
103	0.0038067	-0.0141375
1C4	C.0005602	-0.0171654
106	0.0151087	-0.0026747
1C7	0.0110416	-0.0061170
1C8	0.0067143	-0.0097310
109	0.0030455	-0.0130342
110	-0.0001714	-0.0156253
111	-0.0059094	-C.0182334
112	-0.0126721	-0.0192015
114	0.0158317	-0.0010112
115	0.0132463	-0.0034201
116	0.0094229	-0.0063096
117	C.0055969	-0.0091837
118	0.0021505	-0.0118802
12C	0.0143812	-0.0018131
121	C.0115799	-0.0038044
122	0.0079854	-0.0062810
123	0.0045606	-C.0085964
124	0.0010143	-0.0105650
125	-0.0021359	-0.0121062
126	-C.0087600	-0.0139566
127	-0.0167630	-0.0145021
129	0.0139171	-0.0010786
130	0.0087788	-0.0039485
131	0.0020161	-0.0071298
132	-C.0048049	-0.0090119
133	-0.0121351	-C.0099241
135	0.0115606	-0.0012713
136	0.0060142	-C.0031196
137	-0.0008501	-0.0048125
138	-0.0079830	-0.0057941
139	-C.0154004	-0.0062804
141	0.0128448	-0.0001212
142	0.0090729	-0.0006699
143	0.0030023	-0.0015174
144	-0.0040203	-0.0022120
145	-0.0112633	-0.0026360

147	0.0110356	0.0005305
148	0.0062665	0.0007363
149	-C.C002597	C.0006706
150	-0.0073801	0.0005859
151	-C.0142594	C.0003946
153	0.0120764	0.0007599
154	0.0087392	0.0020513
155	0.0031270	0.0029073
156	-0.0037107	0.0033504
157	-C.0107189	0.0034981
159	0.0103844	0.0025152
160	0.0059458	0.0045206
161	-0.0002829	0.0058091
162	-C.0072030	0.0064241
163	-0.0139429	0.0065412
165	0.0111840	0.0020287
166	C.0080533	C.0055029
167	0.0027483	C.0080013
168	-C.0038147	0.0093478
169	-0.0105909	0.0097472
170	-0.0139173	0.0097727

LOADING - EIGHT X=0.80

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/--------DISPLACEMENT--------		/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0807962	
2	C.0	-0.0790533	
3	0.0	-0.0763665	
4	0.0	-0.0741071	
5	C.0	-0.0712178	
6	C.C	-0.0688545	
7	0.0	-0.0661774	
9	C.C	-0.0618479	
8	0.0	-0.0640514	
10	0.0	-0.0601981	
11	C.0	-0.0577008	
12	0.0	-0.0551482	
13	C.0	-0.0538174	
14	C.0	-0.0519676	
15	0.0	-0.0510186	
75	0.0277750	C.0	
84	0.0239656	0.0	
90	0.0222605	0.0	
99	0.0202982	0.0	
105	0.0192304	0.0	
113	C.0180901	0.0	
119	0.0174391	0.C	
128	0.0162735	0.0	
134	0.0158172	C.C	
140	0.0149156	C.0	
146	0.0145973	0.0	
152	0.0138926	C.C	
158	0.0136425	0.0	
164	C.0127935	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
16	0.0036757	-0.0802691	
17	0.0015474	-0.0757558	
18	0.0002278	-0.0704663	
19	-0.0004611	-0.0653899	
20	-0.0007305	-0.0610568	
21	0.0072530	-0.0782984	
22	0.0048598	-0.0765101	
23	0.0015088	-0.0713930	
24	-0.0003821	-0.0662103	
25	-0.0012618	-0.0616538	
26	-0.0016032	-0.0579004	
27	-0.0021623	-0.0534027	
28	-0.0034654	-0.0506807	
29	0.0107303	-0.0757703	
30	0.0042785	-0.0711986	
31	0.0005212	-0.0660436	
32	-0.0013523	-0.0614167	
33	-0.0021527	-0.0576616	
34	0.0142068	-0.0716805	
35	0.0090584	-0.0696499	
36	0.0025705	-0.0646313	
37	-0.0008143	-0.0600601	
38	-0.0023234	-0.0564328	
39	-0.0028940	-0.0537260	
40	-0.0035497	-0.0518696	
41	-0.0050498	-0.0488582	
42	-0.0092299	-0.0466780	
43	0.0174647	-0.0665018	
44	0.0061568	-0.0617470	
45	0.0005668	-0.0573312	
46	-0.0019904	-0.0540425	
47	-0.0030971	-0.0516240	
48	0.0205746	-0.0594158	
49	0.0117946	-0.0571312	
50	0.0030344	-0.0529187	
51	-0.0009878	-0.0502662	
52	-0.0028036	-0.0484834	
53	-0.0038249	-0.0470392	
54	-0.0056687	-0.0453332	
55	-0.0093274	-0.0436688	
56	0.0229304	-0.0502379	
57	0.0068698	-0.0463924	
58	0.0008776	-0.0447996	
59	-0.0018956	-0.0441213	
60	-0.0033636	-0.0435307	
61	0.0248974	-0.0378245	
62	0.0125290	-0.0370283	
63	0.0038082	-0.0372868	
64	-0.0001770	-0.0383187	
65	-0.0023902	-0.0390024	
66	-0.0036817	-0.0393113	
67	-0.0051256	-0.0394868	
68	-0.0085849	-0.0390320	
69	-0.0156351	-0.0379301	
70	0.0247685	-0.0222852	
71	0.0080830	-0.0272919	
72	0.0025388	-0.0309755	
73	-0.0006522	-0.0333223	
74	-0.0026888	-0.0348258	
76	0.0207142	-0.0092071	
77	0.0141748	-0.0144340	

78	0.0064809	-0.0221677
79	0.0019698	-0.0266163
80	-0.0009171	-0.0294457
81	-0.0030521	-0.0313257
82	-0.0070114	-0.0328041
83	-0.0128293	-0.0328291
85	0.0209594	-0.0037905
86	0.0117521	-0.0125471
87	0.0055518	-0.0191865
88	0.0015680	-0.0234774
89	-0.0012118	-0.0262932
91	0.0169462	-0.0053399
92	0.0099530	-0.0117975
93	0.0047898	-0.0172338
94	0.0011319	-0.0210503
95	-0.0016864	-0.0235438
96	-0.0042736	-0.0251698
97	-0.0098949	-0.0267718
98	-0.0184618	-0.0268126
100	0.0190203	-0.0017223
101	0.0141436	-0.0062832
102	0.0085002	-0.0113309
103	0.0040284	-0.0157562
104	0.0005303	-0.0190373
106	0.0165688	-0.0029760
107	0.0120105	-0.0068282
108	0.0072265	-0.0108493
109	0.0032291	-0.0144897
110	-0.0002554	-0.0173051
111	-0.0064767	-0.0201112
112	-0.0138322	-0.0211376
114	0.0173912	-0.0011197
115	0.0144934	-0.0038031
116	0.0102389	-0.0070281
117	0.0060289	-0.0102160
118	0.0022737	-0.0131851
120	0.0157704	-0.0020124
121	0.0126514	-0.0042290
122	0.0086712	-0.0069871
123	0.0049174	-0.0095547
124	0.0010481	-0.0117214
125	-0.0023805	-0.0134082
126	-0.0095897	-0.0154177
127	-0.0183214	-0.0159970
129	0.0152600	-0.0011962
130	0.0095724	-0.0043962
131	0.0021566	-0.0079276
132	-0.0052848	-0.0099987
133	-0.0132856	-0.0109919
135	0.0126594	-0.0014211
136	0.0065545	-0.0034901
137	-0.0009631	-0.0053743
138	-0.0087570	-0.0064587
139	-0.0168797	-0.0069863
141	0.0140824	-0.0001427
142	0.0099295	-0.0007726
143	0.0032649	-0.0017331
144	-0.0044247	-0.0025140
145	-0.0123539	-0.0029828
147	0.0120949	0.0005617
148	0.0068553	0.0007626
149	-0.0003020	0.0006682
150	-0.0081030	0.0005640
151	-0.0156514	0.0003541
153	0.0132433	0.0008246
154	0.0095762	0.0022213

155	0.0034167	0.0031399
156	-0.0040810	0.0036108
157	-0.0117663	0.0037679
159	0.0113873	0.0027419
160	0.0065137	0.0049233
161	-0.0003199	0.0063205
162	-0.0079100	0.0069859
163	-0.0153073	0.0071133
165	0.0122690	0.0022180
166	0.0088304	0.0060121
167	0.0030079	0.0087350
168	-0.0041921	0.0101994
169	-0.0116281	0.0106335
170	-0.0152794	0.0106614

LOADING - NINE X=0.90

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------DISPLACEMENT	-----------------/	
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0841545	
2	0.0	-0.0824316	
3	0.0	-0.0797706	
4	0.0	-0.0775288	
5	0.0	-0.0746502	
6	0.0	-0.0722896	
7	0.0	-0.0695996	
9	0.0	-0.0652233	
8	0.0	-0.0674580	
10	0.0	-0.0635481	
11	0.0	-0.0609992	
12	0.0	-0.0583606	
13	0.0	-0.0569868	
14	0.0	-0.0550510	
15	0.0	-0.0540548	
75	0.0302705	0.0	
84	0.0258738	0.0	
90	0.0239321	0.0	
99	0.0217545	0.0	
105	0.0205751	0.0	
113	0.0193256	0.0	
119	0.0186135	0.0	
128	0.0173509	0.0	
134	0.0168568	0.0	
140	0.0158906	0.0	
146	0.0155504	0.0	
152	0.0147997	0.0	
158	0.0145350	0.0	
164	0.0136320	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----------------DISPLACEMENT	-----------------/	
	X DISP.	Y DISP.	Z DISP.
16	0.0037537	-0.0836365	
17	0.0016388	-0.0791713	

18	0.0003012	-0.0739101
19	-0.0004210	-0.0688158
20	-0.0007224	-0.0644237
21	0.0074106	-0.0817914
22	0.0050422	-0.0799242
23	0.0016798	-0.0748461
24	-0.0002717	-0.0696536
25	-0.0012221	-0.0650369
26	-0.0016200	-0.0611954
27	-0.0022552	-0.0565535
28	-0.0036479	-0.0537086
29	0.0109728	-0.0792110
30	0.0045612	-0.0746767
31	0.0007314	-0.0695162
32	-0.0012527	-0.0648162
33	-0.0021499	-0.0609569
34	0.0145382	-0.0751960
35	0.0094493	-0.0731833
36	0.0029072	-0.0681629
37	-0.0006292	-0.0634915
38	-0.0022802	-0.0597195
39	-0.0029500	-0.0568950
40	-0.0036745	-0.0549588
41	-0.0053095	-0.0518048
42	-0.0097208	-0.0495065
43	0.0179130	-0.0701668
44	0.0066437	-0.0653920
45	0.0008635	-0.0608286
46	-0.0018942	-0.0573225
47	-0.0031283	-0.0547443
48	0.0211788	-0.0632734
49	0.0124461	-0.0609845
50	0.0034708	-0.0565437
51	-0.0008317	-0.0535416
52	-0.0028065	-0.0515454
53	-0.0039339	-0.0499601
54	-0.0059455	-0.0481227
55	-0.0098376	-0.0463546
56	0.0238381	-0.0545971
57	0.0074767	-0.0502518
58	0.0010890	-0.0480616
59	-0.0018681	-0.0471005
60	-0.0034523	-0.0463518
61	0.0260213	-0.0433790
62	0.0132820	-0.0413265
63	0.0040493	-0.0404842
64	-0.0001226	-0.0411661
65	-0.0024541	-0.0416824
66	-0.0038333	-0.0419017
67	-0.0053743	-0.0420305
68	-0.0090598	-0.0414922
69	-0.0165049	-0.0403114
70	0.0261355	-0.0267869
71	0.0083094	-0.0302350
72	0.0026188	-0.0335922
73	-0.0006839	-0.0358001
74	-0.0028130	-0.0372345
76	0.0218859	-0.0106592
77	0.0146449	-0.0163747
78	0.0066253	-0.0243548
79	0.0019827	-0.0287980
80	-0.0009947	-0.0316172
81	-0.0032259	-0.0334905
82	-0.0074124	-0.0349589
83	-0.0135693	-0.0349467
85	0.0223667	-0.0042259

[illegible]	0.0121682	-0.0139292
87	0.0056917	-0.0209302
88	0.0015682	-0.0253405
89	-0.0013210	-0.0282116
91	0.0179783	-0.0058761
92	0.0103605	-0.0129302
93	0.0049294	-0.0186998
94	0.0011162	-0.0226749
95	-0.0018241	-0.0252524
96	-0.0045500	-0.0269287
97	-0.0104884	-0.0285654
98	-0.0195474	-0.0285846
100	0.0203286	-0.0018647
101	0.0149572	-0.0068549
102	0.0088730	-0.0123252
103	0.0041568	-0.0170336
104	0.0004923	-0.0204780
106	0.0176457	-0.0032201
107	0.0126823	-0.0074120
108	0.0075581	-0.0117485
109	0.0033358	-0.0156276
110	-0.0003319	-0.0185933
111	-0.0068947	-0.0215281
112	-0.0146756	-0.0225887
114	0.0185582	-0.0012042
115	0.0154005	-0.0041098
116	0.0108048	-0.0076059
117	0.0063129	-0.0110332
118	0.0023419	-0.0141988
120	0.0167982	-0.0021694
121	0.0134248	-0.0045660
122	0.0091470	-0.0075469
123	0.0051540	-0.0103069
124	0.0010555	-0.0126179
125	-0.0025718	-0.0144080
126	-0.0102001	-0.0165268
127	-0.0194596	-0.0171260
129	0.0162530	-0.0012873
130	0.0101389	-0.0047506
131	0.0022428	-0.0085508
132	-0.0056457	-0.0107605
133	-0.0141324	-0.0118100
135	0.0134652	-0.0015402
136	0.0069390	-0.0037859
137	-0.0010578	-0.0058181
138	-0.0093324	-0.0069791
139	-0.0179729	-0.0075351
141	0.0149964	-0.0001613
142	0.0105553	-0.0008599
143	0.0034482	-0.0019133
144	-0.0047308	-0.0027625
145	-0.0131633	-0.0032651
147	0.0128752	0.0005790
148	0.0072836	0.0007689
149	-0.0003411	0.0006468
150	-0.0086430	0.0005253
151	-0.0166868	0.0003018
153	0.0141055	0.0008702
154	0.0101915	0.0023391
155	0.0036247	0.0032979
156	-0.0043608	0.0037850
157	-0.0125465	0.0039478
159	0.0121275	0.0029051
160	0.0069296	0.0052115
161	-0.0003527	0.0066842
162	-0.0084386	0.0073842

163	-0.0163232	0.0075189
165	0.0130718	0.0023564
166	0.0094032	0.0063828
167	0.0031958	0.0092666
168	-0.0044763	0.0108141
169	-0.0124014	0.0112727
170	-0.0162938	0.0113022

APPENDIX 2

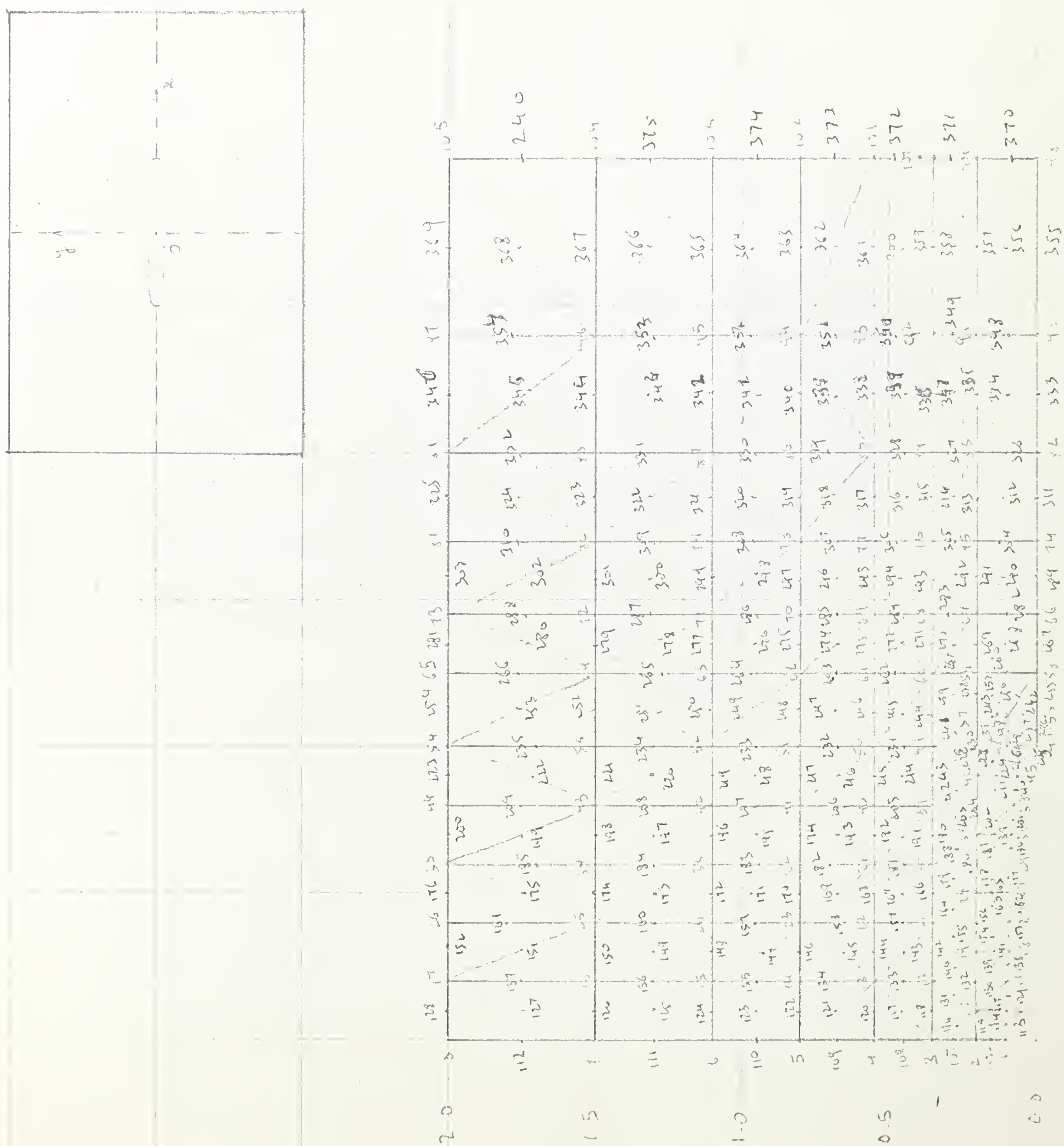
Elliptic slit , 'LST' type .

The following presents :

1- Plate division , the numbers are node names , page 77 .

2- Input data , pp 78 - 97 .

3 -Output data , pp 98 - 121



```
        APPENDIX 2  'ELLIPTIC SLIT'
        'LST' TYPE
        TYPE PLANE STRESS
        UNITS INCHES
        UNITS POUNDS
        JOINT COORDINATES
        1 .0 .1 S
106 S
        2 .0 .2 S
107 S
        3 .0 .35 S
108 S
        4 .0 .55 S
109 S
        5 .0 .8 S
110 S
        6 .0 1.1 S
111 S
        7 .0 1.5 S
112 S
        8 .0 2. S
113
114
115
116
        9 .1 .0006
117
        10 .1 .2
```

118
119
120
121
122
123
124
125
126
127
128
129
130
131
11 .2 .098
132
12 .2 .35
133
13 .2 .55
134
14 .2 .8
135
15 .2 1.1
136
16 .2 1.5
137
17 .2 2.
138
139
140
18 .3 .0955
141
19 .3 .2

142

143

144

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146

147

148

149

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152

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155

20 .4 .0917

156

21 .4 .35

157

22 .4 .55

158

23 .4 .8

159

24 .4 1.1

160

25 .4 1.5

161

26 .4 2.

162

163

164

27 .5 .0866

165

28 .5 .2

166
167
168
169
170
171
172
173
174
175
176
177
178
179
29 .6 .08
180
30 .6 .35
181
31 .6 .55
182
32 .6 .8
183
33 .6 1.1
184
34 .6 1.5
185
35 .6 2.
186
187
188
36 .7 .0714
189
37 .7 .2

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202

203

38 .8 .06

204

39 .8 .35

205

40 .8 .55

206

41 .8 .8

207

42 .8 1.1

208

43 .8 1.5

209

44 .8 2.

210

211

212

45 .9 .0436

224

46 .9 .2

213

214

215

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47 1. .C S

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48 1. .1

230

49 1. .35

231

50 1. .55

232

51 1. .8

233

52 1. 1.1

234

53 1. 1.5

235

54 1. 2.

236 S

237

238

240

241

55 1.1 .0 S

242

56 1.1 .1

243

57 1.1 .2

244

245

246

247

248

249

250

251

252

253

254

255 S

256

257

258

259

58 1.25 .0 S

260

59 1.25 .2

261

60 1.25 .35

262

61 1.25 .55

263

62 1.25 .8

264

63 1.25 1.1

265

64 1.25 1.5

266

65 1.25 2.

267 S

268

269

270

271

272

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281

66 1.45 .0 S

282

67 1.45 .2

283

68 1.45 .35

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69 1.45 .55

285

70 1.45 .8

286

71 1.45 1.1

287

72 1.45 1.5

288

73 1.45 2.

289 S

290

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293

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300

301

302

303

74 1.7 .C S

304

75 1.7 .2

305

76 1.7 .35

306

77 1.7 .55

307

78 1.7 .8

308

79 1.7 1.1

309

80 1.7 1.5

310

81 1.7 2.

311 S

312
313
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315
316
317
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319
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321
322
323
324
325
82 2. .C S
326
83 2. .2
327
84 2. .35
328
85 2. .55
329
86 2. .8
330
87 2. 1.1
331
88 2. 1.5
332
89 2. 2.
333 S
334
335
347

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90 2.4 .0 S

348

91 2.4 .2

349

92 2.4 .35

350

93 2.4 .55

351

94 2.4 .8

352

95 2.4 1.1

353

96 2.4 1.5

354

97 2.4 2.

355 S

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362
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369
        98 3. .05
370
        99 3. .2
371
        100 3. .35
372
        101 3. .55
373
        102 3. .8
374
        103 3. 1.1
375
        104 3. 1.5
240
        105 3. 2.
        ELEMENT INCIDENCES
        1 1 10 2            114 115 106
        2 1 9 10            113 117 114
        3 9 11 10           129 130 117
        4 11 19 10          139 132 130
        5 11 18 19          138 141 139
        6 18 20 19          153 154 141
        7 20 28 19          163 156 154
        8 20 27 28          162 165 163
        9 27 29 28          177 178 165
```

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10 29 37 28       187 190 179
11 29 36 37       186 189 187
12 36 38 37       201 202 189
13 38 46 37       211 204 202
14 38 45 46       212 224 211
15 45 48 46       226 227 224
16 45 47 48       225 229 226
17 46 48 57       227 239 230
18 48 56 57       238 243 239
19 48 47 56       229 237 238
20 47 55 56       236 242 237
21 2 10 3 115 116 107
22 3 10 12 116 131 118
23 10 19 12       132 140 131
24 19 21 12       155 142 140
25 19 28 21       156 164 155
26 28 30 21 179 166 164
27 28 37 30       180 188 179
28 37 39 30 203 190 188
29 37 46 39       204 212 203
30 46 49 39       228 213 212
31 46 57 49       230 241 228
32 57 60 49       259 244 241
33 57 59 60       258 261 259
34 57 56 59       243 257 258
35 56 58 59       256 260 257
36 56 55 58       242 255 256
37 3 13 4 119 120 108
38 3 12 13 118 133 119
39 12 21 13 142 143 133
40 21 22 13 157 144 143
41 21 31 22 167 168 157
42 21 30 31 166 181 167
```

43 31 30 39 181 180 1 1

44 39 40 31 205 192 191

45 39 50 40 214 215 205

46 39 49 50 213 231 214

47 49 60 50 244 245 231

48 60 61 50 262 246 245

49 61 60 60 262 272 273

50 60 68 69 271 284 272

51 60 67 68 270 283 271

52 60 59 67 261 269 270

53 59 58 67 260 268 269

54 58 66 67 267 282 268

55 4 13 5 120 121 109

56 13 14 5 134 122 121

57 13 23 14 145 146 134

58 13 22 23 144 158 145

59 22 31 23 168 169 158

60 31 32 23 182 170 169

61 31 41 32 193 194 182

62 31 40 41 192 206 193

63 40 50 41 215 216 206

64 50 51 41 232 217 216

65 50 62 51 247 243 232

66 50 61 62 246 263 247

67 61 69 62 273 274 263

68 62 69 70 274 285 275

69 69 78 70 296 297 285

70 69 77 78 295 307 296

71 76 77 69 306 295 294

72 68 76 69 293 294 284

73 67 76 68 292 293 283

74 67 75 75 291 305 292

75 67 74 75 290 304 291

76 66 74 67 289 [illegible] 277
77 5 15 6 123 124 110
78 5 14 15 122 135 123
79 14 23 15 146 147 135
80 15 23 24 147 159 148
81 24 23 33 159 171 172
82 23 32 33 170 183 171
83 33 32 41 183 194 195
84 33 41 42 195 207 196
85 42 41 52 207 218 219
86 41 51 52 217 233 218
87 52 51 62 233 248 249
88 52 62 63 249 264 250
89 62 71 63 276 277 264
90 62 70 71 275 286 276
91 70 78 71 297 298 286
92 71 78 79 298 308 299
93 79 78 87 308 320 321
94 78 86 87 319 330 320
95 78 85 86 318 329 319
96 77 85 7[illegible] 317 318 307
97 76 85 77 316 317 306
98 76 84 85 315 328 316
99 76 83 84 314 327 315
100 75 83 76 313 314 305
101 75 74 83 304 312 313
102 74 82 83 311 326 312
103 6 15 7 124 125 111
104 7 15 16 125 136 126
105 15 25 16 149 150 136
106 15 24 25 148 160 149
107 24 33 25 172 173 160
108 25 33 34 173 184 174

109	33	43	34	197	198	184
110	33	42	43	196	209	197
111	43	42	52	208	219	220
112	43	52	53	220	234	221
113	52	64	53	251	252	234
114	52	63	64	250	265	251
115	63	71	64	277	278	265
116	64	71	72	278	287	279
117	71	80	72	300	301	287
118	71	79	80	299	309	300
119	79	87	80	321	322	309
120	80	87	88	322	331	323
121	88	87	96	331	343	344
122	87	95	96	342	353	343
123	87	94	95	341	352	342
124	86	94	87	340	341	330
125	85	94	86	339	340	329
126	85	93	94	338	351	339
127	85	92	93	337	350	338
128	84	92	85	336	337	328
129	84	83	92	327	347	336
130	83	91	92	335	349	347
131	83	90	91	334	348	335
132	82	90	83	333	334	326
133	7	17	8	127	128	112
134	7	16	17	126	137	127
135	17	16	25	137	150	151
136	17	25	26	151	161	152
137	25	35	26	175	176	161
138	25	34	35	174	185	175
139	35	34	43	185	198	199
140	35	43	44	199	209	200
141	44	43	54	209	222	223

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142 43 53 54 221 235 222
143 54 53 64 225 252 253
144 54 64 55 253 266 254
145 65 64 73 266 282 281
146 64 72 73 279 288 280
147 73 72 80 283 301 302
148 73 80 81 302 311 303
149 81 80 89 310 324 325
150 80 88 89 323 332 324
151 89 88 96 332 344 345
152 89 96 97 345 354 346
153 97 96 105 354 368 369
154 96 104 105 367 240 368
155 96 103 104 366 375 367
156 96 95 103 353 365 366
157 95 94 103 352 364 365
158 94 102 103 363 374 364
159 94 101 102 362 373 363
160 94 93 101 351 361 362
161 93 92 101 350 360 361
162 92 100 101 359 372 360
163 92 99 100 358 371 359
164 92 91 99 349 357 358
165 91 90 99 348 356 357
166 90 98 99 355 370 356
ELEMENT PROPERTIES
1 TO 166 TYPE 'LST' THICKNESS .2
CONSTANTS
E 30000. ALL
POISSON .3 ALL
JOINT RELEASES
1 TO 8 106 TO 112 FORCE Y
47 55 58 65 74 82 90 98 236 255 267 289 311 333 355 FORCE X
```

```
$ SIGMAC=[illegible], L=[illegible]/L [illegible], KNCMDIM=(SIGMAC/VAVG)/(I/L)
        LOADING 'TWO' 'R=0.2'
        JOINT LOADS
          1 FORCE Y - 5.0
        113 FORCE Y -10.0
          9 FORCE Y -10.0
        129 FORCE Y -10.0
         11 FORCE Y - 5.0
        LOADING 'FOUR' 'R=0.4'
        JOINT LOADS
          1 FORCE Y - 5.0
        113 FORCE Y -10.0
          9 FORCE Y -10.0
        129 FORCE Y -10.0
         11 FORCE Y -10.0
        138 FORCE Y -10.0
         18 FORCE Y -10.0
        153 FORCE Y -10.0
         20 FORCE Y - 5.0
        LOADING 'SIX' 'R=0.6'
        JOINT LOADS
          1 FORCE Y - 5.0
        113 FORCE Y -10.0
          9 FORCE Y -10.0
        129 FORCE Y -10.0
         11 FORCE Y -10.0
        138 FORCE Y -10.0
         18 FORCE Y -10.0
        153 FORCE Y -10.0
         20 FORCE Y -10.0
        162 FORCE Y -10.0
         27 FORCE Y -10.0
        177 FORCE Y -10.0
```

```
 29 FORCE Y - 5.0
LOADING 'LIGHT' '[illegible]'
JOINT LOADS
  1 FORCE Y - 5.0
113 FORCE Y -10.0
  9 FORCE Y -10.0
129 FORCE Y -10.0
 11 FORCE Y -10.0
138 FORCE Y -10.0
 18 FORCE Y -10.0
153 FORCE Y -10.0
 20 FORCE Y -10.0
162 FORCE Y -10.0
 27 FORCE Y -10.0
177 FORCE Y -10.0
 29 FORCE Y -10.0
186 FORCE Y -10.0
 36 FORCE Y -10.0
201 FORCE Y -10.0
 38 FORCE Y - 5.0
STIFFNESS ANALYSIS 5
LIST DISPLACEMENTS STRESSES ALL
```

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0256535	
106	0.0	-0.0255622	
2	0.0	-0.0249852	
107	0.0	-0.0235650	
3	0.0	-0.0220893	
108	0.0	-0.0203728	
4	0.0	-0.0189739	
109	0.0	-0.0175866	
5	0.0	-0.0164598	
110	0.0	-0.0154245	
6	0.0	-0.0146294	
111	0.0	-0.0138556	
7	0.0	-0.0133155	
112	0.0	-0.0128731	
8	0.0	-0.0124225	
47	0.0066792	0.0	
236	0.0061071	0.0	
55	0.0056996	0.0	
255	0.0053390	0.0	
58	0.0050430	0.0	
267	0.0047423	0.0	
66	0.0045081	0.0	
289	0.0042864	0.0	
74	0.0040974	0.0	
311	0.0039203	0.0	
82	0.0037762	0.0	
333	0.0036206	0.0	
90	0.0034895	0.0	
355	0.0033330	0.0	
98	0.0031262	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
113	0.0012143	-0.0266964	
114	0.0009819	-0.0258106	
115	0.0005020	-0.0248779	
116	0.0001109	-0.0233580	
9	0.0027458	-0.0270476	
117	0.0016601	-0.0256651	
10	0.0008243	-0.0243080	
118	-0.0001401	-0.0213735	
119	-0.0002699	-0.0198949	
120	-0.0002960	-0.0186269	
121	-0.0003219	-0.0173294	
122	-0.0003227	-0.0162827	

123	-0.0002964	-0.0152834
124	-0.0002781	-0.0145159
125	-0.0002840	-0.0137693
126	-0.0003129	-0.0132495
127	-0.0004168	-0.0127958
128	-0.0006302	-0.0123750
129	0.0044132	-0.0245943
130	0.0022828	-0.0237074
131	0.0002421	-0.0216509
11	0.0053714	-0.0213803
132	0.0014705	-0.0209835
12	-0.0000273	-0.0195637
133	-0.0003916	-0.0185908
13	-0.0005300	-0.0176526
134	-0.0005628	-0.0166079
14	-0.0005775	-0.0157304
135	-0.0005665	-0.0148683
15	-0.0005431	-0.0141797
136	-0.0005508	-0.0135076
16	-0.0006139	-0.0130265
137	-0.0008229	-0.0125865
17	-0.0012470	-0.0122118
138	0.0056260	-0.0189865
139	0.0034577	-0.0189576
140	0.0007237	-0.0188605
18	0.0053836	-0.0172349
141	0.0037650	-0.0172293
19	0.0023987	-0.0173418
142	0.0002917	-0.0172606
143	-0.0002641	-0.0167921
144	-0.0005408	-0.0162472
145	-0.0007073	-0.0155444
146	-0.0007565	-0.0148843
147	-0.0007682	-0.0142097
148	-0.0007666	-0.0136541
149	-0.0007966	-0.0130766
150	-0.0008957	-0.0126560
151	-0.0012081	-0.0122699
152	-0.0018341	-0.0118922
153	0.0053534	-0.0158973
154	0.0040098	-0.0159354
155	0.0014359	-0.0161135
20	0.0053641	-0.0147463
156	0.0030213	-0.0148525
21	0.0007624	-0.0149906
157	0.0000114	-0.0148748
22	-0.0004379	-0.0146446
158	-0.0007242	-0.0142547
23	-0.0008479	-0.0138368
159	-0.0009000	-0.0133612
24	-0.0009357	-0.0129524
160	-0.0010090	-0.0125042
25	-0.0011493	-0.0121569
161	-0.0015679	-0.0118352
26	-0.0023834	-0.0114759
162	0.0054351	-0.0137148
163	0.0042865	-0.0137352
164	0.0019840	-0.0138891
27	0.0055095	-0.0127398
165	0.0044265	-0.0127628
28	0.0034024	-0.0128102
166	0.0012338	-0.0129664
167	0.0003400	-0.0130163
168	-0.0002344	-0.0129815
169	-0.0006321	-0.0128377
170	-0.0008408	-0.0126416

171	-0.00[illegible]763	-0.0123783
172	-0.001249[illegible]	-0.0121136
173	-0.0011707	-0.0116171
174	-0.0013746	-0.0115625
175	-0.0018957	-0.0112874
176	-0.0028722	-0.0109843
177	0.0056156	-0.0118047
178	0.0045463	-0.0118269
179	0.0023556	-0.0119358
29	0.0057123	-0.0108885
180	0.0036687	-0.0109346
30	0.0015666	-0.0111044
181	0.0006545	-0.0112271
31	0.0000168	-0.0113269
182	-0.0004721	-0.0113856
32	-0.0007640	-0.0113778
183	-0.0009695	-0.0113073
33	-0.0011056	-0.0111998
184	-0.0012873	-0.0110389
34	-0.0015616	-0.0108763
185	-0.0021847	-0.0106600
35	-0.0033068	-0.0104127
186	0.0058236	-0.0099685
187	0.0046624	-0.0099784
188	0.0025908	-0.0100836
36	0.0059215	-0.0090385
189	0.0047501	-0.0090487
37	0.0037082	-0.0090712
190	0.0018123	-0.0092955
191	0.0009267	-0.0095111
192	0.0002828	-0.0097220
193	-0.0002659	-0.0099430
194	-0.0006255	-0.0100946
195	-0.0009012	-0.0101928
196	-0.0011034	-0.0102254
197	-0.0013669	-0.0101970
198	-0.0017109	-0.0101203
199	-0.0024290	-0.0099737
200	-0.0036722	-0.0097632
201	0.0060394	-0.0080775
202	0.0048364	-0.0080823
203	0.0027315	-0.0082304
38	0.0061324	-0.0070630
204	0.0037182	-0.0071261
39	0.0020134	-0.0075188
205	0.0011920	-0.0078625
40	0.0005571	-0.0081845
206	-0.0000238	-0.0085439
41	-0.0004359	-0.0088342
207	-0.0007827	-0.0090765
42	-0.0010577	-0.0092268
208	-0.0014049	-0.0093185
43	-0.0018198	-0.0093221
209	-0.0026312	-0.0092371
44	-0.0039769	-0.0090749
210	0.0062176	-0.0059315
211	0.0047035	-0.0059608
212	0.0028384	-0.0063454
45	0.0062444	-0.0046661
224	0.0047396	-0.0047498
46	0.0037057	-0.0050556
213	0.0022347	-0.0058037
214	0.0014704	-0.0062952
215	0.0003474	-0.0067471
216	0.0002[illegible]	-0.0072349
217	-	-0.0076303

218	-0.0016239	-0.0079883
219	-0.0009747	-0.0082353
220	-0.0014912	-0.0084271
221	-0.0018966	-0.0085002
222	-0.0027912	-0.0084725
223	-0.0042145	-0.0083543
225	0.0064446	-0.0029778
226	0.0054130	-0.0031776
227	0.0043149	-0.0036724
228	0.0030104	-0.0045413
229	0.0056995	-0.0012373
48	0.0049628	-0.0021211
230	0.0038510	-0.0031416
49	0.0025169	-0.0042664
231	0.0017832	-0.0049004
50	0.0011673	-0.0054626
232	0.0005432	-0.0060427
51	0.0000402	-0.0065133
233	-0.0004455	-0.0069529
52	-0.0008575	-0.0072763
234	-0.0013678	-0.0075443
53	-0.0019404	-0.0076757
235	-0.0029109	-0.0076994
54	-0.0043743	-0.0076133
237	0.0057041	-0.0005965
238	0.0050742	-0.0012830
239	0.0044923	-0.0018804
241	0.0032775	-0.0030686
242	0.0055069	-0.0004158
56	0.0050732	-0.0008785
243	0.0045767	-0.0013787
57	0.0040942	-0.0018589
244	0.0028835	-0.0028602
245	0.0021855	-0.0035223
246	0.0015789	-0.0041073
247	0.0009140	-0.0047402
248	0.0003577	-0.0052663
249	-0.0001940	-0.0057662
250	-0.0006792	-0.0061422
251	-0.0012957	-0.0064812
252	-0.0019579	-0.0066660
253	-0.0030062	-0.0067322
254	-0.0044924	-0.0067019
256	0.0052200	-0.0002901
257	0.0045933	-0.0009677
258	0.0041939	-0.0013387
259	0.0035980	-0.0018907
260	0.0047932	-0.0004622
59	0.0042098	-0.0010261
261	0.0037036	-0.0014761
60	0.0031880	-0.0019356
262	0.0025220	-0.0025359
61	0.0019271	-0.0030774
263	0.0012634	-0.0036788
62	0.0006786	-0.0042027
264	0.0000593	-0.0047168
63	-0.0004937	-0.0051129
265	-0.0011963	-0.0054831
64	-0.0019366	-0.0057009
266	-0.0030500	-0.0057930
65	-0.0045333	-0.0058154
268	0.0045840	-0.0003563
269	0.0041710	-0.0007635
270	0.0037615	-0.0011123
271	0.0033213	-0.0014770
272	0.0027289	-0.0019685

273	0.0021573	-0.0024477
274	0.0015209	-0.0029956
275	0.0009060	-0.0034805
276	0.0002542	-0.0039749
277	-0.0003456	-0.0043687
278	-0.0011078	-0.0047396
279	-0.0017026	-0.0049625
280	-0.0030530	-0.0050840
281	-0.0045218	-0.0051182
282	0.0043969	-0.0002883
67	0.0040897	-0.0005551
283	0.0037623	-0.0008628
68	0.0033920	-0.0011483
284	0.0028681	-0.0015446
69	0.0023397	-0.0019468
285	0.0016981	-0.0024313
70	0.0011014	-0.0028669
286	0.0004327	-0.0033193
71	-0.0002014	-0.0036939
287	-0.0010179	-0.0040513
72	-0.0018565	-0.0042745
288	-0.0030344	-0.0044120
73	-0.0044742	-0.0044451
290	0.0042020	-0.0002148
291	0.0039664	-0.0004511
292	0.0037168	-0.0006430
293	0.0034183	-0.0008528
294	0.0029675	-0.0011554
295	0.0024922	-0.0014682
296	0.0018925	-0.0018561
297	0.0013023	-0.0022247
298	0.0006200	-0.0026152
299	-0.0000399	-0.0029415
300	-0.0009045	-0.0032734
301	-0.0017897	-0.0034872
302	-0.0029895	-0.0036160
303	-0.0043710	-0.0036830
304	0.0040380	-0.0001578
75	0.0038535	-0.0003339
305	0.0036480	-0.0004778
76	0.0033988	-0.0006324
306	0.0030124	-0.0008573
77	0.0025875	-0.0010933
307	0.0020285	-0.0013934
78	0.0014582	-0.0016888
308	0.0007713	-0.0020150
79	0.0000974	-0.0022914
309	-0.0007973	-0.0025792
80	-0.0017171	-0.0027745
310	-0.0029257	-0.0028873
81	-0.0042453	-0.0029758
312	0.0038721	-0.0001081
313	0.0037274	-0.0002224
314	0.0035595	-0.0003188
315	0.0033500	-0.0004236
316	0.0030205	-0.0005733
317	0.0026451	-0.0007354
318	0.0021289	-0.0009489
319	0.0015846	-0.0011616
320	0.0009128	-0.0014036
321	0.0002299	-0.0016193
322	-0.0006904	-0.0018436
323	-0.0016300	-0.0019970
324	-0.0028347	-0.0021093
325	-0.0040833	-0.0021849
326	0.0037346	-0.0000641

83	0.0036116	-0.0001304
327	0.0034767	-0.0001861
84	0.0032903	-0.0002483
328	0.0029933	-0.0003402
85	0.0025594	-0.0004414
329	0.0021818	-0.0005799
86	0.0016547	-0.0007206
330	0.0010100	-0.0008842
87	0.0003700	-0.0010359
331	-0.0006251	-0.0011978
88	-0.0015506	-0.0013145
332	-0.0027423	-0.0014038
89	-0.0039244	-0.0014629
334	0.0035353	-0.0000070
335	0.0034808	-0.0000181
347	0.0033595	-0.0000288
336	0.0032040	-0.0000430
337	0.0029469	-0.0000705
338	0.0026411	-0.0001059
339	0.0022034	-0.0001574
340	0.0017158	-0.0002162
341	0.0010809	-0.0002906
342	0.0004097	-0.0003612
343	-0.0005171	-0.0004444
344	-0.0014628	-0.0005085
345	-0.0026363	-0.0005619
346	-0.0037451	-0.0006141
348	0.0034621	0.0000467
91	0.0033700	0.0000907
349	0.0032583	0.0001212
92	0.0031139	0.0001488
350	0.0028815	0.0001813
93	0.0025999	0.0002068
351	0.0021873	0.0002301
94	0.0017199	0.0002426
352	0.0011042	0.0002490
95	0.0004483	0.0002470
353	-0.0004650	0.0002407
96	-0.0014040	0.0002282
354	-0.0025548	0.0002118
97	-0.0036138	0.0001825
356	0.0033013	0.0001404
357	0.0032132	0.0002785
358	0.0031147	0.0003790
359	0.0029860	0.0004763
360	0.0027662	0.0006002
361	0.0025004	0.0007156
362	0.0021139	0.0008456
363	0.0016707	0.0009602
364	0.0010798	0.0010758
365	0.0004422	0.0011684
366	-0.0004554	0.0012602
367	-0.0013730	0.0013178
368	-0.0024922	0.0013481
369	-0.0035401	0.0013495
370	0.0031036	0.0002684
99	0.0030287	0.0005333
371	0.0029290	0.0007269
100	0.0028025	0.0009156
372	0.0025295	0.0011536
101	0.0023524	0.0013785
373	0.0019785	0.0016321
102	0.0015546	0.0018597
374	0.0009899	0.0020837
103	0.0003714	0.0022686
375	-0.0004986	0.0024312

104	-0.0013827	0.0025342
240	-0.0024839	0.0025774
105	-0.0035400	0.0025791

LOADING - FOUR R=0.4

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0489526	
106	0.0	-0.0489868	
2	0.0	-0.0485278	
107	0.0	-0.0471729	
3	0.0	-0.0455439	
108	0.0	-0.0432174	
4	0.0	-0.0410668	
109	0.0	-0.0386378	
5	0.0	-0.0365195	
110	0.0	-0.0344575	
6	0.0	-0.0328309	
111	0.0	-0.0312027	
7	0.0	-0.0300430	
112	0.0	-0.0290750	
8	0.0	-0.0280743	
47	0.0153397	0.0	
236	0.0139951	0.0	
55	0.0130445	0.0	
255	0.0122000	0.0	
58	0.0115082	0.0	
267	0.0108070	0.0	
66	0.0102629	0.0	
289	0.0097500	0.0	
74	0.0093139	0.0	
311	0.0089073	0.0	
82	0.0085776	0.0	
333	0.0082227	0.0	
90	0.0079247	0.0	
355	0.0075698	0.0	
98	0.0071009	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
113	0.0012239	-0.0501993	
114	0.0013705	-0.0493878	
115	0.0010438	-0.0485709	
116	0.0006049	-0.0470753	
9	0.0027313	-0.0511538	
117	0.0024734	-0.0497706	
10	0.0019484	-0.0484570	
118	0.0005147	-0.0449885	
119	0.0000044	-0.0427155	
120	-0.0002658	-0.0405799	
121	-0.0004667	-0.0382044	
122	-0.0005568	-0.0361795	

123	-0.0005724	-0.0341801
124	-0.0005740	-0.0325944
125	-0.0006115	-0.0310180
126	-0.0006902	-0.0298994
127	-0.0009303	-0.0289054
128	-0.0014068	-0.0279690
129	0.0042264	-0.0500944
130	0.0036582	-0.0492084
131	0.0015965	-0.0460953
11	0.0061436	-0.0497067
132	0.0034333	-0.0469256
12	0.0018915	-0.0432766
133	-0.0000125	-0.0411026
13	-0.0005457	-0.0391069
134	-0.0008720	-0.0369698
14	-0.0010325	-0.0351567
135	-0.0011055	-0.0333551
15	-0.0011273	-0.0318981
136	-0.0011907	-0.0304578
16	-0.0013572	-0.0294148
137	-0.0018379	-0.0284456
17	-0.0027851	-0.0276083
138	0.0080208	-0.0475863
139	0.0057798	-0.0466317
140	0.0023291	-0.0435259
18	0.0097261	-0.0459815
141	0.0068554	-0.0445779
19	0.0047380	-0.0432044
142	0.0012238	-0.0400533
143	0.0000221	-0.0383382
144	-0.0007116	-0.0367795
145	-0.0011305	-0.0350405
146	-0.0014084	-0.0335309
147	-0.0015407	-0.0320202
148	-0.0016087	-0.0307956
149	-0.0017293	-0.0295315
150	-0.0019851	-0.0286065
151	-0.0027016	-0.0277485
152	-0.0040986	-0.0269028
153	0.0115342	-0.0420296
154	0.0077943	-0.0411626
155	0.0029413	-0.0391318
20	0.0131172	-0.0374220
156	0.0058460	-0.0371061
21	0.0016989	-0.0357535
157	0.0002552	-0.0347161
22	-0.0006746	-0.0337075
158	-0.0013341	-0.0325073
23	-0.0016673	-0.0314030
159	-0.0018561	-0.0302589
24	-0.0019901	-0.0293075
160	-0.0022033	-0.0282921
25	-0.0025552	-0.0275126
161	-0.0035108	-0.0267901
26	-0.0053309	-0.0259824
162	0.0130371	-0.0337817
163	0.0092932	-0.0337719
164	0.0038349	-0.0337313
27	0.0129351	-0.0308096
165	0.0098130	-0.0308245
28	0.0070850	-0.0309945
166	0.0024001	-0.0310270
167	0.0006606	-0.0306577
168	-0.0004548	-0.0301826
169	-0.0012764	-0.0295370
170	-0.0017441	-0.0288952

171	-0.0020558	-0.0281658
172	-0.0022642	-0.0275139
173	-0.0025778	-0.0267945
174	-0.0030657	-0.0262260
175	-0.0042507	-0.0255790
176	-0.0064325	-0.0248936
177	0.0130626	-0.0282586
178	0.0102419	-0.0283168
179	0.0048165	-0.0286004
29	0.0132039	-0.0258892
180	0.0078610	-0.0260396
30	0.0031281	-0.0263691
181	0.0012209	-0.0264702
31	-0.0000631	-0.0264756
182	-0.0010447	-0.0263414
32	-0.0016586	-0.0261370
183	-0.0021116	-0.0258335
33	-0.0024241	-0.0255055
184	-0.0028570	-0.0250846
34	-0.0034944	-0.0246888
185	-0.0049064	-0.0241874
35	-0.0074166	-0.0236245
186	0.0134247	-0.0236072
187	0.0105412	-0.0236257
188	0.0055056	-0.0239108
36	0.0136225	-0.0213333
189	0.0107708	-0.0213550
37	0.0082404	-0.0214265
190	0.0037612	-0.0219495
191	0.0018192	-0.0223682
192	0.0004633	-0.0227312
193	-0.0006775	-0.0230682
194	-0.0014224	-0.0232644
195	-0.0020101	-0.0233617
196	-0.0024567	-0.0233511
197	-0.0030565	-0.0232187
198	-0.0038416	-0.0230109
199	-0.0054645	-0.0226612
200	-0.0082485	-0.0221774
201	0.0138847	-0.0190154
202	0.0109906	-0.0190263
203	0.0059371	-0.0193901
38	0.0140881	-0.0165900
204	0.0083206	-0.0167426
39	0.0043003	-0.0176668
205	0.0024427	-0.0184365
40	0.0010561	-0.0191189
206	-0.0001817	-0.0198436
41	-0.0010488	-0.0204038
207	-0.0017858	-0.0208513
42	-0.0023864	-0.0211173
208	-0.0031637	-0.0212592
43	-0.0040997	-0.0212306
209	-0.0059296	-0.0210177
44	-0.0089468	-0.0206393
210	0.0142790	-0.0139086
211	0.0106899	-0.0139749
212	0.0062524	-0.0148835
45	0.0143331	-0.0109240
224	0.0107821	-0.0111180
46	0.0083279	-0.0118348
213	0.0048646	-0.0135868
214	0.0031140	-0.0147193
215	0.0017207	-0.0157367
216	0.0004201	-0.0168012
217	-0.0005597	-0.0176409

218	-0.0014724	-0.0183817
219	-0.0022251	-0.0188808
220	-0.0031741	-0.0192592
221	-0.0042866	-0.0193905
222	-0.0063014	-0.0193054
223	-0.[illegible]024745	-0.0190277
225	0.0147065	-0.0069637
226	0.0123752	-0.0074286
227	0.0097823	-0.0085838
228	0.0066964	-0.0106160
229	0.0130466	-0.0028880
48	0.0113150	-0.0049504
230	0.0086901	-0.0073317
49	0.0055578	-0.0099576
231	0.0038671	-0.0114274
50	0.0024704	-0.0127181
232	0.0010854	-0.0140236
51	-0.0000176	-0.0150640
233	-0.0010791	-0.0160173
52	-0.0019821	-0.0167067
234	-0.0031143	-0.0172687
53	-0.0043980	-0.0175364
235	-0.0065822	-0.0175687
54	-0.0098728	-0.0173640
237	0.0130549	-0.0013882
238	0.0115759	-0.0029876
239	0.0102064	-0.0043796
241	0.0073478	-0.0071516
242	0.0125924	-0.0009653
56	0.0115739	-0.0020401
243	0.0104071	-0.0032043
57	0.0092730	-0.0043228
244	0.0064429	-0.0066528
245	0.0048281	-0.0081903
246	0.0034421	-0.0095409
247	0.0019417	-0.0109900
248	0.0007001	-0.0121792
249	-0.0005206	-0.0132945
250	-0.0015942	-0.0141231
251	-0.0029672	-0.0148608
252	-0.0044509	-0.0152567
253	-0.0068106	-0.0153899
254	-0.0101603	-0.0153101
256	0.0119209	-0.0006711
257	0.0104504	-0.0022428
258	0.0095135	-0.0031049
259	0.0081183	-0.0043890
260	0.0109226	-0.0010677
59	0.0095565	-0.0023749
261	0.0083739	-0.0034199
60	0.0071738	-0.0044877
262	0.0056306	-0.0058827
61	0.0042652	-0.0071359
263	0.0027567	-0.0085207
62	0.0014382	-0.0097176
264	0.0000528	-0.0108810
63	-0.0011818	-0.0117698
265	-0.0027526	-0.0125920
64	-0.0044132	-0.0130701
266	-0.0069217	-0.0132669
65	-0.0102851	-0.0133063
268	0.0104370	-0.0008218
269	0.0094726	-0.0017634
270	0.0035182	-0.0025724
271	0.0074954	-0.0034188
272	0.0061246	-0.0045593

273	0.0043102	-0.0056697
274	0.0033128	-0.0069341
275	0.0019657	-0.0080467
276	0.0004986	-0.0091739
277	-0.0008474	-0.0100650
278	-0.0025567	-0.0108975
279	-0.0043428	-0.0113935
280	-0.0069376	-0.0116591
281	-0.0102608	-0.0117273
282	0.0100037	-0.0006648
67	0.0092885	-0.0013733
283	0.0085274	-0.0019933
68	0.0076688	-0.0026551
284	0.0064580	-0.0035739
69	0.0052430	-0.0045061
285	0.0037757	-0.0056261
70	0.0024204	-0.0066287
286	0.0009095	-0.0076650
71	-0.0005192	-0.0085179
287	-0.0023550	-0.0093263
72	-0.0042434	-0.0098277
288	-0.0069037	-0.0101321
73	-0.0101663	-0.0101998
290	0.0095539	-0.0004954
291	0.0090070	-0.0010413
292	0.0084289	-0.0014851
293	0.0077385	-0.0019711
294	0.0066987	-0.0026728
295	0.0056064	-0.0033977
296	0.0042342	-0.0042956
297	0.0028898	-0.0051468
298	0.0013430	-0.0060446
299	-0.0001482	-0.0067917
300	-0.0020989	-0.0075479
301	-0.0040966	-0.0080320
302	-0.0068103	-0.0083203
303	-0.0099466	-0.0084657
304	0.0091767	-0.0003642
75	0.0087498	-0.0007714
305	0.0082752	-0.0011046
76	0.0077003	-0.0014631
306	0.0068106	-0.0019849
77	0.0058354	-0.0025322
307	0.0045562	-0.0032277
78	0.0032559	-0.0039113
308	0.0016951	-0.0046640
79	0.0001685	-0.0052997
309	-0.0018549	-0.0059589
80	-0.0039348	-0.0064038
310	-0.0066728	-0.0066579
81	-0.0096737	-0.0068540
312	0.0087962	-0.0002505
313	0.0084628	-0.0005157
314	0.0080762	-0.0007395
315	0.0075941	-0.0009833
316	0.0068371	-0.0013313
317	0.0059766	-0.0017082
318	0.0047958	-0.0022044
319	0.0035542	-0.0026980
320	0.0020259	-0.0032587
321	0.0004754	-0.0037571
322	-0.0016103	-0.0042735
323	-0.0037394	-0.0046250
324	-0.00647[illegible]0	-0.0048801
325	-0.0093179	-0.0050483
326	0.0034820	-0.0001500

83	0.00[illegible]1551	-0.0003052
327	0.0078757	-0.0004356
84	0.0074617	-0.0005811
328	0.0067922	-0.0007961
85	0.0060164	-0.0010328
329	0.0049246	-0.0013563
86	0.0037459	-0.0016846
330	0.0022544	-0.0020657
87	0.0007285	-0.0024180
331	-0.0014145	-0.0027932
88	-0.0035604	-0.0030622
332	-0.0062682	-0.0032771
89	-0.0089640	-0.0033977
334	0.0081418	-0.0000196
335	0.0079923	-0.0000484
347	0.0076245	-0.0000758
336	0.0072685	-0.0001111
337	0.0066801	-0.0001783
338	0.0059811	-0.0002637
339	0.0049815	-0.0003871
340	0.0038694	-0.0005273
341	0.0024228	-0.0007037
342	0.0008956	-0.0008703
343	-0.0012119	-0.0010659
344	-0.0033616	-0.0012154
345	-0.0060321	-0.0013378
346	-0.0085628	-0.0014552
348	0.0078619	0.0001032
91	0.0076513	0.0002001
349	0.0073959	0.0002672
92	0.0070657	0.0003272
350	0.0065348	0.0003978
93	0.0058914	0.0004520
351	0.0049499	0.0005003
94	0.0038841	0.0005238
352	0.0024807	0.0005328
95	0.0009872	0.0005234
353	-0.0010913	0.0005039
96	-0.0032283	0.0004723
354	-0.0058499	0.0004338
97	-0.0082678	0.0003674
356	0.0074976	0.0003172
357	0.0072962	0.0006291
358	0.0070714	0.0008558
359	0.0067773	0.0010754
360	0.0062755	0.0013548
361	0.0056690	0.0016146
362	0.0047871	0.0019070
363	0.0037765	0.0021645
364	0.0024298	0.0024237
365	0.0009770	0.0026309
366	-0.0010674	0.0028361
367	-0.0031577	0.0029649
368	-0.0057091	0.0030325
369	-0.0081014	0.0030355
370	0.0070492	0.0006091
99	0.0068781	0.0012105
371	0.0066505	0.0016498
100	0.0063617	0.0020779
372	0.0058984	0.0026176
101	0.0053344	0.0031273
373	0.0044815	0.0037016
102	0.0035151	0.0042167
374	0.0022276	0.0047235
103	0.0008178	0.0051414
375	-0.0011645	0.0055082

104	-0.0[illegible]31797	0.0057410
240	-0.0056994	0.0058387
105	-0.[illegible]81009	0.0058433

LOADING - SIX [illegible]

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0664430	
106	0.0	-0.0665298	
2	0.0	-0.0661355	
107	0.0	-0.0648769	
3	0.0	-0.0633215	
108	0.0	-0.0609817	
4	0.0	-0.0586625	
109	0.0	-0.0558737	
5	0.0	-0.0533082	
110	0.0	-0.0506855	
6	0.0	-0.0485526	
111	0.0	-0.0463487	
7	0.0	-0.0447383	
112	0.0	-0.0433588	
8	0.0	-0.0419042	
47	0.0236795	0.0	
236	0.0215407	0.0	
55	0.0200172	0.0	
255	0.0186684	0.0	
58	0.0175669	0.0	
267	0.0164557	0.0	
66	0.0155980	0.0	
289	0.0147957	0.0	
74	0.0141172	0.0	
311	0.0134897	0.0	
82	0.0129837	0.0	
333	0.0124429	0.0	
90	0.0119911	0.0	
355	0.0114567	0.0	
98	0.0107507	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
113	0.0013629	-0.0677201	
114	0.0015734	-0.0669626	
115	0.0012995	-0.0662147	
116	0.0009952	-0.0648212	
9	0.0030078	-0.0687717	
117	0.0028872	-0.0674419	
10	0.0024689	-0.0662113	
118	0.0011034	-0.0628917	
119	0.0004435	-0.0605364	
120	-0.0000044	-0.0581836	
121	-0.0003696	-0.0553982	
122	-0.0005809	-0.0528964	

123	-0.0006918	-0.0503350
124	-0.0007555	-0.0482369
125	-0.0008519	-0.0460520
126	-0.0009933	-0.0445346
127	-0.0013617	-0.0431166
128	-0.0020601	-0.0417511
129	0.0047134	-0.0678944
130	0.0042887	-0.0670573
131	0.0025192	-0.0641294
11	0.0066255	-0.0677902
132	0.0046316	-0.0651787
12	0.0020274	-0.0615027
133	0.0008054	-0.0590776
13	-0.0000660	-0.0567174
134	-0.0007336	-0.0540225
14	-0.0011104	-0.0516744
135	-0.0013511	-0.0492797
15	-0.0014925	-0.0473035
136	-0.0016660	-0.0453140
16	-0.0019586	-0.0438491
137	-0.0026919	-0.0424572
17	-0.0040809	-0.0412297
138	0.0085460	-0.0661691
139	0.0069608	-0.0652880
140	0.0038934	-0.0622214
18	0.0102446	-0.0653707
141	0.0083860	-0.0639595
19	0.0066675	-0.0625762
142	0.0027631	-0.0588380
143	0.0010297	-0.0564367
144	-0.0001709	-0.0542254
145	-0.0010623	-0.0517883
146	-0.0015753	-0.0496728
147	-0.0019331	-0.0475400
148	-0.0021538	-0.0458095
149	-0.0024313	-0.0440219
150	-0.0028734	-0.0427006
151	-0.0039631	-0.0414546
152	-0.0060099	-0.0402119
153	0.0119789	-0.0629503
154	0.0098011	-0.0620503
155	0.0050457	-0.0588427
20	0.0139174	-0.0612966
156	0.0084082	-0.0584018
21	0.0032835	-0.0547827
157	0.0011918	-0.0526148
22	-0.0002163	-0.0507256
158	-0.0013162	-0.0486573
23	-0.0019671	-0.0469379
159	-0.0023988	-0.0451947
24	-0.0027051	-0.0437726
160	-0.0031201	-0.0422786
25	-0.0037130	-0.0411371
161	-0.0051588	-0.0400738
26	-0.0078264	-0.0388810
162	0.0159316	-0.0579526
163	0.0120381	-0.0568967
164	0.0059130	-0.0537962
27	0.0177507	-0.0551307
165	0.0131949	-0.0536213
28	0.0097115	-0.0521742
166	0.0037156	-0.0492145
167	0.0013912	-0.0476697
168	-0.0001616	-0.0463095
169	-0.0014181	-0.0448435
170	-0.0021883	-0.0436014

171	-0.0027382	-0.0423346
172	-0.0031312	-0.0412780
173	-0.0036353	-0.0401550
174	-0.0044712	-0.0392608
175	-0.0062573	-0.0383228
176	-0.0094605	-0.0373024
177	0.0196613	-0.0499854
178	0.0142252	-0.0490417
179	0.0065781	-0.0469906
29	0.0213205	-0.0441042
180	0.0107066	-0.0437094
30	0.0043005	-0.0425597
181	0.0017491	-0.0418339
31	0.0000379	-0.0411691
182	-0.0013064	-0.0404262
32	-0.0022024	-0.0397658
183	-0.0029063	-0.0390622
33	-0.0034177	-0.0384299
184	-0.0041251	-0.0377069
34	-0.0051191	-0.0370701
185	-0.0072373	-0.0363017
35	-0.0109291	-0.0354567
186	0.0213928	-0.0391718
187	0.0155423	-0.0391171
188	0.0073902	-0.0392015
36	0.0213925	-0.0348049
189	0.0161242	-0.0347821
37	0.0116916	-0.0349772
190	0.0049900	-0.0354077
191	0.0023573	-0.0355380
192	0.0005417	-0.0356335
193	-0.0009837	-0.0356724
194	-0.0020033	-0.0356285
195	-0.0028555	-0.0355117
196	-0.0035314	-0.0353305
197	-0.0044551	-0.0350064
198	-0.0056528	-0.0346330
199	-0.0080794	-0.0340775
200	-0.0121802	-0.0333416
201	0.0216632	-0.0307089
202	0.0165988	-0.0307236
203	0.0082294	-0.0313357
38	0.0218651	-0.0265960
204	0.0121586	-0.0268872
39	0.0058268	-0.0282841
205	0.0031976	-0.0292479
40	0.0012762	-0.0300413
206	-0.0004101	-0.0308217
41	-0.0015828	-0.0313963
207	-0.0026151	-0.0318296
42	-0.0034907	-0.0320653
208	-0.0046543	-0.0321441
43	-0.0060599	-0.0320295
209	-0.0087378	-0.0316721
44	-0.0132398	-0.0310850
210	0.0221058	-0.0222055
211	0.0161968	-0.0222986
212	0.0089109	-0.0237814
45	0.0221379	-0.0173715
224	0.0163757	-0.0176720
46	0.0123541	-0.0188274
213	0.0068305	-0.0215844
214	0.0042244	-0.0232712
215	0.0022221	-0.0247029
216	0.0004106	-0.0261349
217	-0.0009452	-0.0272227

218	-0.0022285	-0.0281484
219	-0.0033093	-0.0287548
220	-0.0047074	-0.0291993
221	-0.0063639	-0.0293242
222	-0.0093609	-0.0291521
223	-0.0140526	-0.0287147
225	0.0228414	-0.0110468
226	0.0133723	-0.0117732
227	0.0147672	-0.0136022
228	0.0097594	-0.0168227
229	0.0200363	-0.0045612
48	0.0172584	-0.0078162
230	0.0130069	-0.0115745
49	0.0082165	-0.0157123
231	0.0054402	-0.0179807
50	0.0033686	-0.0199209
232	0.0013813	-0.0218111
51	-0.0001865	-0.0232776
233	-0.0016981	-0.0245841
52	-0.0029933	-0.0255080
234	-0.0046514	-0.0262461
53	-0.0065544	-0.0265811
235	-0.0098005	-0.0265850
54	-0.0146763	-0.0262589
237	0.0200374	-0.0021780
238	0.0176697	-0.0046924
239	0.0154671	-0.0068822
241	0.0108763	-0.0112523
242	0.0192951	-0.0015056
56	0.0176646	-0.0031850
243	0.0157940	-0.0050120
57	0.0139761	-0.0067706
244	0.0094949	-0.0104204
245	0.0069982	-0.0128126
246	0.0049049	-0.0148852
247	0.0026806	-0.0170720
248	0.0008685	-0.0188260
249	-0.0008961	-0.0204395
250	-0.0024529	-0.0216177
251	-0.0044668	-0.0226477
252	-0.0066604	-0.0231880
253	-0.0101672	-0.0233516
254	-0.0151473	-0.0232086
256	0.0182225	-0.0010388
257	0.0158731	-0.0034856
258	0.0143777	-0.0048341
259	0.0121599	-0.0068459
260	0.0166332	-0.0016465
59	0.0144600	-0.0036798
261	0.0125881	-0.0053100
60	0.0107043	-0.0069781
262	0.0083022	-0.0091561
61	0.0062156	-0.0110942
263	0.0039483	-0.0132132
62	0.0019904	-0.0150190
264	-0.0000449	-0.0167463
63	-0.0018567	-0.0180497
265	-0.0041700	-0.0192371
64	-0.0066261	-0.0199167
266	-0.0103582	-0.0201842
65	-0.0153750	-0.0202192
268	0.0158686	-0.0012628
269	0.0143426	-0.0027190
270	0.0128390	-0.0039773
271	0.0112372	-0.0052956
272	0.0091075	-0.0070710

273	0.0070839	-0.0087940
274	0.0048215	-0.0107384
275	0.0028057	-0.0124322
276	0.0006289	-0.0141295
277	-0.0013610	-0.0154559
278	-0.0038871	-0.0166798
279	-0.0065350	-0.0173989
280	-0.0104009	-0.0177743
281	-0.0153691	-0.0178566
282	0.0151894	-0.0010207
67	0.0140642	-0.0021120
283	0.0128707	-0.0030733
68	0.0115306	-0.0041012
284	0.0096533	-0.0055287
69	0.0077360	-0.0069754
285	0.0055532	-0.0087045
70	0.0035133	-0.0102402
286	0.0012573	-0.0118138
71	-0.0008671	-0.0130965
287	-0.0035902	-0.0142999
72	-0.0063973	-0.0150389
288	-0.0102673	-0.0154784
73	-0.0152557	-0.0155642
290	0.0144886	-0.0007596
291	0.0136334	-0.0016005
292	0.0127324	-0.0022863
293	0.0116598	-0.0030396
294	0.0100519	-0.0041289
295	0.0083743	-0.0052534
296	0.0062826	-0.0066429
297	0.0042492	-0.0079540
298	0.0019275	-0.0093267
299	-0.0003005	-0.0104611
300	-0.0032082	-0.0116007
301	-0.0061872	-0.0123232
302	-0.0102452	-0.0127465
303	-0.0149577	-0.0129508
304	0.0139042	-0.0005587
75	0.0132407	-0.0011862
305	0.0125045	-0.0017013
76	0.0116156	-0.0022567
306	0.0102443	-0.0030669
77	0.0087489	-0.0039164
307	0.0067988	-0.0049945
78	0.0048280	-0.0060515
308	0.0024761	-0.0072093
79	0.0001864	-0.0081817
309	-0.0028400	-0.0091836
80	-0.0059505	-0.0098544
310	-0.0100540	-0.0102317
81	-0.0145751	-0.0105152
312	0.0133181	-0.0003864
313	0.0128032	-0.0007961
314	0.0122070	-0.0011432
315	0.0114648	-0.0015219
316	0.0103027	-0.0020634
317	0.0089861	-0.0026501
318	0.0071869	-0.0034220
319	0.0053037	-0.0041883
320	0.0029954	-0.0050563
321	0.0006620	-0.0058247
322	-0.0024679	-0.0066161
323	-0.0056608	-0.0071510
324	-0.0097684	-0.0075342
325	-0.0140647	-0.0077797
326	0.0128368	-0.0002340

83	0.0124027	-0.0004764
327	0.0119059	-0.0006804
84	0.0112712	-0.0009082
328	0.0102467	-0.0012451
85	0.0090626	-0.0016161
329	0.0074006	-0.0021231
86	0.0056112	-0.0026364
330	0.0033576	-0.0032305
87	0.0010264	-0.0037783
331	-0.0021679	-0.0043588
88	-0.0053939	-0.0047718
332	-0.0094714	-0.0050971
89	-0.0135509	-0.0052728
334	0.0123192	-0.0000360
335	0.0119529	-0.0000866
347	0.0115285	-0.0001336
336	0.0109851	-0.0001931
337	0.0100877	-0.0003041
338	0.0090235	-0.0004434
339	0.0075044	-0.0006430
340	0.0058177	-0.0008686
341	0.0036287	-0.0011502
342	0.0013221	-0.0014150
343	-0.0018560	-0.0017237
344	-0.0050961	-0.0019576
345	-0.0091262	-0.0021443
346	-0.0129612	-0.0023183
348	0.0118954	0.0001501
91	0.0115744	0.0002902
349	0.0111854	0.0003868
92	0.0106828	0.0004723
350	0.0098751	0.0005716
93	0.0088973	0.0006457
351	0.0074680	0.0007084
94	0.0058525	0.0007336
352	0.0037273	0.0007350
95	0.0014701	0.0007102
353	-0.0016688	0.0006695
96	-0.0048952	0.0006143
354	-0.0088579	0.0005537
97	-0.0125246	0.0004538
356	0.0113468	0.0004745
357	0.0110408	0.0009408
358	0.0106990	0.0012797
359	0.0102522	0.0016075
360	0.0094901	0.0020242
361	0.0085697	0.0024110
362	0.0072319	0.0028454
363	0.0057001	0.0032270
364	0.0036612	0.0036099
365	0.0014635	0.0039150
366	-0.0016281	0.0042168
367	-0.0047832	0.0044059
368	-0.0086492	0.0045046
369	-0.0122774	0.0045089
370	0.0106723	0.0009172
99	0.0104122	0.0018226
371	0.0100667	0.0024839
100	0.0096282	0.0031280
372	0.0089243	0.0039392
101	0.0080688	0.0047047
373	0.0067758	0.0055664
102	0.0053116	0.0063383
374	0.0033615	0.0070963
103	0.0012273	0.0077207
375	-0.0017717	0.0082672

104	-0.0048204	0.0086144
240	-0.0086216	0.0087606
105	-0.0122763	0.0087687

LOADING - EIGHT R=0.8

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0790450	
106	0.0	-0.0791711	
2	0.0	-0.0788202	
107	0.0	-0.0776277	
3	0.0	-0.0761351	
108	0.0	-0.0738548	
4	0.0	-0.0715309	
109	0.0	-0.0686616	
5	0.0	-0.0659477	
110	0.0	-0.0630914	
6	0.0	-0.0607151	
111	0.0	-0.0581989	
7	0.0	-0.0563168	
112	0.0	-0.0546607	
8	0.0	-0.0528788	
47	0.0316241	0.0	
236	0.0285694	0.0	
55	0.0263967	0.0	
255	0.0244790	0.0	
58	0.0229280	0.0	
267	0.0213813	0.0	
66	0.0202000	0.0	
289	0.0191115	0.0	
74	0.0181990	0.0	
311	0.0173661	0.0	
82	0.0167005	0.0	
333	0.0159961	0.0	
90	0.0154125	0.0	
355	0.0147290	0.0	
98	0.0138282	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
113	0.0014848	-0.0803314	
114	0.0017135	-0.0796134	
115	0.0014557	-0.0789094	
116	0.0010787	-0.0775849	
9	0.0032513	-0.0814122	
117	0.0031684	-0.0801217	
10	0.0027834	-0.0789363	
118	0.0014593	-0.0757496	
119	0.0007580	-0.0734344	
120	0.0002382	-0.0710648	
121	-0.0002202	-0.0681791	
122	-0.0005163	-0.0655102	

123	-0.0007117	-0.0627069
124	-0.0008405	-0.0603561
125	-0.0010016	-0.0578977
126	-0.0012067	-0.0563732
127	-0.0016803	-0.0543694
128	-0.0025421	-0.0526913
129	0.0050746	-0.0305870
130	0.0047114	-0.0797886
131	0.0030494	-0.0769783
11	0.0071031	-0.0805607
132	0.0052784	-0.0780386
12	0.0027441	-0.0744308
133	0.0014235	-0.0720606
13	0.0004109	-0.0696363
134	-0.0004589	-0.0667744
14	-0.0010032	-0.0642157
135	-0.0014005	-0.0615417
15	-0.0016667	-0.0592915
136	-0.0019653	-0.0569846
16	-0.0023829	-0.0552558
137	-0.0033241	-0.0535737
17	-0.0050387	-0.0520570
138	0.0091342	-0.0790525
139	0.0076738	-0.0782166
140	0.0048049	-0.0752642
18	0.0109398	-0.0784033
141	0.0092614	-0.0770345
19	0.0076815	-0.0757167
142	0.0038483	-0.0720496
143	0.0019258	-0.0695643
144	0.0004877	-0.0671784
145	-0.0007010	-0.0644711
146	-0.0014598	-0.0620695
147	-0.0020369	-0.0596017
148	-0.0024252	-0.0575747
149	-0.0028792	-0.0554632
150	-0.0035052	-0.0538808
151	-0.0049008	-0.0523599
152	-0.0074267	-0.0508216
153	0.0127480	-0.0761937
154	0.0108393	-0.0753324
155	0.0063816	-0.0722503
20	0.0147433	-0.0748304
156	0.0099037	-0.0720798
21	0.0047342	-0.0683553
157	0.0022790	-0.0658947
22	0.0005357	-0.0636792
158	-0.0009320	-0.0612263
23	-0.0018872	-0.0590830
159	-0.0025809	-0.0569543
24	-0.0030820	-0.0552199
160	-0.0037163	-0.0533975
25	-0.0045449	-0.0520002
161	-0.0063901	-0.0506853
26	-0.0096838	-0.0492020
162	0.0167579	-0.0719823
163	0.0135371	-0.0709908
164	0.0076926	-0.0678405
27	0.0185295	-0.0699404
165	0.0149866	-0.0684125
28	0.0118083	-0.0669029
166	0.0053469	-0.0632288
167	0.0025328	-0.0610360
168	0.0005683	-0.0591107
169	-0.0011091	-0.0570520
170	-0.0021942	-0.0553503

171	-0.0030126	-0.0536714
172	-0.0036186	-0.0523012
173	-0.0044268	-0.0508637
174	-0.0054931	-0.0497331
175	-0.0077648	-0.0485554
176	-0.0117277	-0.0472753
177	0.0203541	-0.0662854
178	0.0164048	-0.0652440
179	0.0086526	-0.0618751
29	0.0223493	-0.0633306
180	0.0131727	-0.0600317
30	0.0057762	-0.0566900
181	0.0027304	-0.0549306
31	0.0006062	-0.0534799
182	-0.0011320	-0.0520837
32	-0.0023143	-0.0509470
183	-0.0032833	-0.0498409
33	-0.0040160	-0.0489166
184	-0.0050000	-0.0479186
34	-0.0063143	-0.0470732
185	-0.0089997	-0.0460855
35	-0.0135764	-0.0450157
186	0.0244475	-0.0585539
187	0.0181531	-0.0572338
188	0.0092330	-0.0541112
36	0.0263115	-0.0541742
189	0.0191738	-0.0524162
37	0.0139095	-0.0508062
190	0.0061366	-0.0485331
191	0.0030416	-0.0476824
192	0.0008708	-0.0470809
193	-0.0009553	-0.0465093
194	-0.0022176	-0.0460537
195	-0.0033252	-0.0456006
196	-0.0042253	-0.0451855
197	-0.0054485	-0.0446377
198	-0.0070039	-0.0440964
199	-0.0100716	-0.0433575
200	-0.0151642	-0.0424131
201	0.0282806	-0.0473608
202	0.0201187	-0.0462157
203	0.0096017	-0.0444630
38	0.0299056	-0.0394878
204	0.0142962	-0.0391101
39	0.0067049	-0.0393766
205	0.0037106	-0.0397725
40	0.0014826	-0.0401476
206	-0.0004897	-0.0405662
41	-0.0018746	-0.0408832
207	-0.0031417	-0.0411099
42	-0.0042499	-0.0411953
208	-0.0057449	-0.0411278
43	-0.0075437	-0.0408939
209	-0.0109828	-0.0403938
44	-0.0165270	-0.0396251
210	0.0300038	-0.0321296
211	0.0203615	-0.0321409
212	0.0103008	-0.0337390
45	0.0297636	-0.0246541
224	0.0208885	-0.0250380
46	0.0149223	-0.0267248
213	0.0078398	-0.0300465
214	0.0047672	-0.0317875
215	0.0024517	-0.0332043
216	0.0003585	-0.0346106
217	-0.0012322	-0.0356615

218	-0.0027715	-0.0365339
219	-0.0040988	-0.0370942
220	-0.0058620	-0.0374863
221	-0.0079588	-0.0375477
222	-0.0117292	-0.0372711
223	-0.0175309	-0.0366887
225	0.0305695	-0.0155376
226	0.0249650	-0.0164985
227	0.0186523	-0.0190985
228	0.0116245	-0.0235222
229	0.0264747	-0.0063256
48	0.0224228	-0.0108449
230	0.0162085	-0.0160847
49	0.0094881	-0.0216409
231	0.0062933	-0.0244983
50	0.0038075	-0.0268300
232	0.0014774	-0.0289760
51	-0.0003845	-0.0306076
233	-0.0022011	-0.0320334
52	-0.0037749	-0.0330244
234	-0.0058391	-0.0338027
53	-0.0082321	-0.0341312
235	-0.0123116	-0.0340742
54	-0.0184079	-0.0336343
237	0.0264333	-0.0029706
238	0.0230201	-0.0064254
239	0.0198327	-0.0094490
241	0.0133725	-0.0154830
242	0.0253649	-0.0020273
56	0.0230256	-0.0043021
243	0.0203457	-0.0068122
57	0.0177679	-0.0092389
244	0.0116520	-0.0141691
245	0.0084247	-0.0173201
246	0.0058114	-0.0199722
247	0.0030750	-0.0226917
248	0.0008771	-0.0248085
249	-0.0012593	-0.0267220
250	-0.0031622	-0.0280956
251	-0.0056602	-0.0292739
252	-0.0084051	-0.0298761
253	-0.0128109	-0.0300292
254	-0.0190613	-0.0298137
256	0.0238433	-0.0013766
257	0.0205094	-0.0046704
258	0.0184051	-0.0065052
259	0.0153287	-0.0092432
260	0.0216104	-0.0021690
59	0.0185679	-0.0049009
261	0.0159880	-0.0071002
60	0.0134410	-0.0093520
262	0.0102559	-0.0122699
61	0.0075719	-0.0148144
263	0.0047215	-0.0175385
62	0.0022933	-0.0198124
264	-0.0002122	-0.0219413
63	-0.0024502	-0.0235272
265	-0.0053263	-0.0249478
64	-0.0083959	-0.0257469
266	-0.0130892	-0.0260424
65	-0.0194088	-0.0260501
268	0.0205630	-0.0016523
269	0.0184516	-0.0035840
270	0.0163942	-0.0052719
271	0.0142320	-0.0070407
272	0.0114035	-0.0094142

273	0.0087732	-0.0116966
274	0.0058825	-0.0142281
275	0.0033516	-0.0163976
276	0.0006376	-0.0185377
277	-0.0018333	-0.0201837
278	-0.0049878	-0.0216839
279	-0.0083039	-0.0225537
280	-0.0131718	-0.0229916
281	-0.0194473	-0.0230650
282	0.0196388	-0.0013333
67	0.0181010	-0.0027690
283	0.0164798	-0.0040494
68	0.0146787	-0.0054209
284	0.0121871	-0.0073236
69	0.0097440	-0.0092442
285	0.0068702	-0.0115143
70	0.0042824	-0.0135046
286	0.0014470	-0.0155170
71	-0.0012157	-0.0171358
287	-0.0046233	-0.0186361
72	-0.0081481	-0.0195465
288	-0.0131557	-0.0200741
73	-0.0193467	-0.0201585
290	0.0185950	-0.0009895
291	0.0175387	-0.0020943
292	0.0163280	-0.0030007
293	0.0148959	-0.0040013
294	0.0127673	-0.0054503
295	0.0105713	-0.0069423
296	0.0078659	-0.0087765
297	0.0052639	-0.0104921
298	0.0023222	-0.0122677
299	-0.0004868	-0.0137205
300	-0.0041460	-0.0151653
301	-0.0078988	-0.0160704
302	-0.0130290	-0.0165902
303	-0.0190179	-0.0168269
304	0.0179150	-0.0007274
75	0.0170270	-0.0015511
305	0.0160457	-0.0022310
76	0.0148671	-0.0029671
306	0.0130591	-0.0040443
77	0.0111046	-0.0051720
307	0.0085785	-0.0065989
78	0.0060463	-0.0079906
308	0.0030487	-0.0095024
79	0.0001468	-0.0107617
309	-0.0036781	-0.0120474
80	-0.0076092	-0.0128989
310	-0.0128105	-0.0133693
81	-0.0185748	-0.0137113
312	0.0171389	-0.0005061
313	0.0164573	-0.0010448
314	0.0156697	-0.0015041
315	0.0146923	-0.0020071
316	0.0131689	-0.0027277
317	0.0114522	-0.0035094
318	0.0091213	-0.0045354
319	0.0066978	-0.0055501
320	0.0037445	-0.0066941
321	0.0007728	-0.0076999
322	-0.0031991	-0.0087276
323	-0.0072486	-0.0094156
324	-0.0124709	-0.0099008
325	-0.0179652	-0.0102004
326	0.0165075	-0.0003107

83	0.0159375	-0.0006330
327	0.0152062	-0.0009054
84	0.0144555	-0.0012103
328	0.0131186	-0.0016620
85	0.0115799	-0.0021599
329	0.0094286	-0.0028399
86	0.0071245	-0.0035255
330	0.0042361	-0.0043161
87	0.0012585	-0.0050414
331	-0.0028092	-0.0058044
88	-0.0069131	-0.0063423
332	-0.0121108	-0.0067581
89	-0.0173417	-0.0069726
334	0.0158346	-0.0000557
335	0.0153572	-0.0001312
347	0.0148047	-0.0002002
336	0.0140982	-0.0002861
337	0.0129330	-0.0004437
338	0.0115544	-0.0006391
339	0.0095926	-0.0009170
340	0.0074209	-0.0012285
341	0.0046112	-0.0016137
342	0.0016588	-0.0019735
343	-0.0024007	-0.0023898
344	-0.0065362	-0.0027013
345	-0.0116876	-0.0029427
346	-0.0166145	-0.0031595
348	0.0152883	0.0001833
91	0.0148719	0.0003533
349	0.0143677	0.0004692
92	0.0137169	0.0005705
350	0.0126721	0.0006860
93	0.0114088	0.0007682
351	0.0095658	0.0008319
94	0.0074871	0.0008471
352	0.0047578	0.0008289
95	0.0018642	0.0007798
353	-0.0021525	0.0007096
96	-0.0062797	0.0006272
354	-0.0113556	0.0005457
97	-0.0160716	0.0004187
356	0.0145871	0.0006004
357	0.0141916	0.0011903
358	0.0137501	0.0016184
359	0.0131730	0.0020320
360	0.0121897	0.0025571
361	0.0110033	0.0030435
362	0.0092801	0.0035878
363	0.0073094	0.0040642
364	0.0046904	0.0045402
365	0.0018706	0.0049177
366	-0.0020925	0.0052904
367	-0.0061423	0.0055236
368	-0.0110952	0.0056445
369	-0.0157623	0.0056495
370	0.0137270	0.0011705
99	0.0133913	0.0023255
371	0.0129455	0.0031689
100	0.0123799	0.0039897
372	0.0114728	0.0050223
101	0.0103693	0.0059955
373	0.0087052	0.0070891
102	0.0068224	0.0080671
374	0.0043161	0.0090249
103	0.0015758	0.0098126
375	-0.0022711	0.0104990

104	-0.0061817	0.0109354
240	-0.0110607	0.0111199
105	-0.0157606	0.0111323

APPENDIX 3

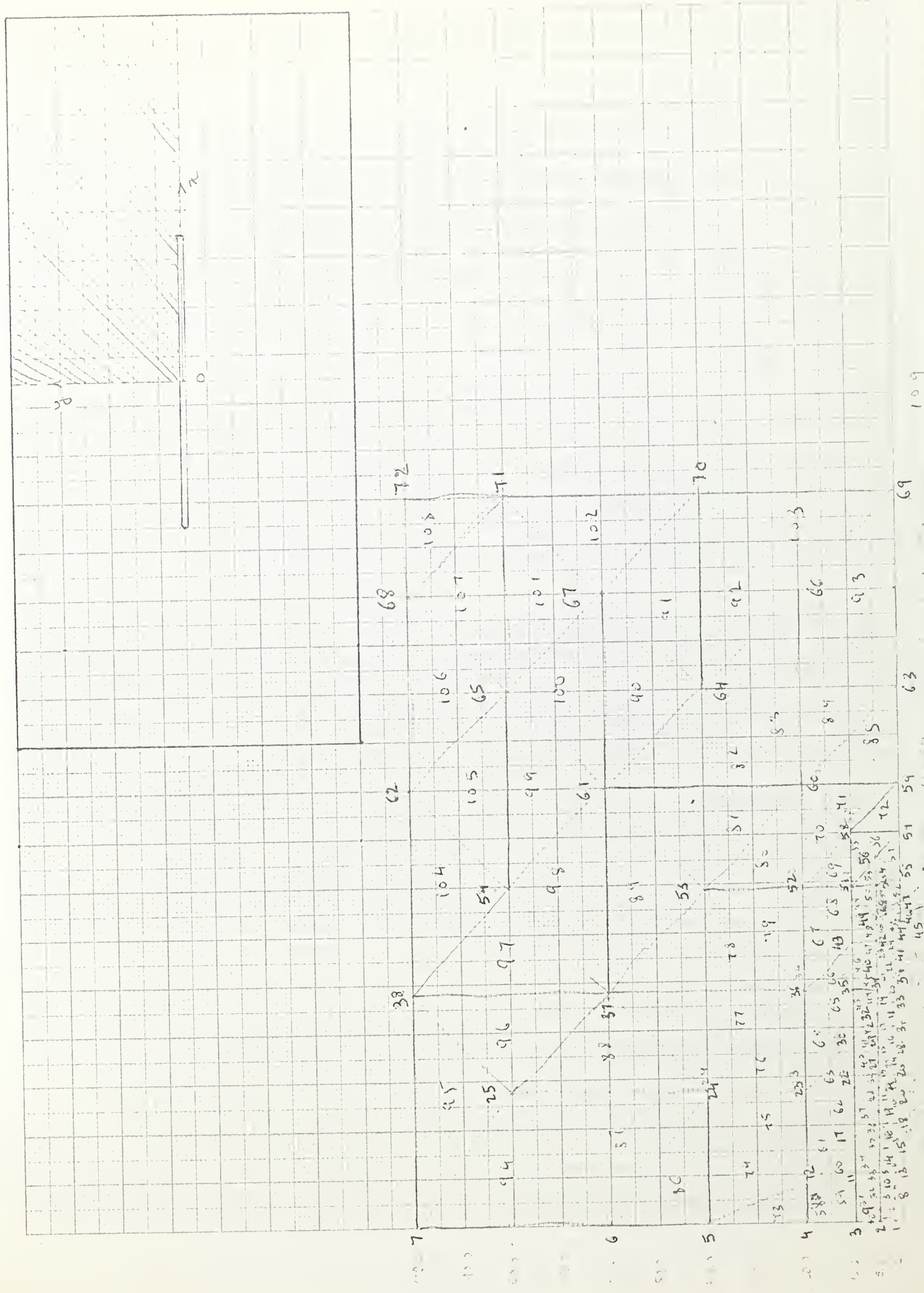
Straight slit , 'CSTG' type .

The following presents :

1- Plate division , numbers are element names and node names ,,page 123

2- Input data , pp 124 - 131 .

3- Output data , pp 132 - 139 .



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APPENDIX 2  'STRAIGHT SLIT'
TYPE PLANE STRESS
UNITS CENTIMETERS KILOGRAMS
JOINT COORDINATES
  1    .00    .15  S
  2    .00    .50  S
  3    .00   1.00  S
  4    .00   2.00  S
  5    .00   4.00  S
  6    .00   6.00  S
  7    .00  10.00  S
  8    .50    .15
  9    .25    .50
 10    .75    .50
 11    .75   1.00
 12    .75   2.00
 13   1.00    .15
 14   1.25    .50
 15   1.50    .15
 16   1.75    .50
 17   1.75   1.00
 18   2.00    .15
 19   2.25    .50
 20   2.50    .15
```

21	2.75	.50	
22	2.75	1.00	
23	2.75	2.00	
24	2.75	4.00	
25	2.75	8.00	
26	3.00	.15	
27	3.25	.50	
28	3.50	.15	
29	3.75	.50	
30	3.75	1.00	
31	4.00	.15	
32	4.25	.50	
33	4.50	.15	
34	4.75	.50	
35	4.75	1.00	
36	4.75	2.00	
37	4.75	6.00	
38	4.75	10.00	
39	5.00	.15	
40	5.25	.50	
41	5.50	.15	
42	5.75	.50	
43	5.75	1.00	
44	6.00	.15	
45	6.10	.10	
46	6.15	.00	S
47	6.50	.00	S
48	6.30	.30	
49	6.25	.50	
50	6.90	.50	
51	6.90	1.00	
52	6.90	2.00	
53	6.90	4.00	

54	7.00	8.00	
55	7.15	.00	S
56	7.50	.50	
57	8.00	.00	S
58	8.00	1.00	
59	9.00	.00	S
60	9.00	2.00	
61	9.00	6.00	
62	9.00	10.00	
63	11.00	.00	S
64	11.00	4.00	
65	11.00	8.00	
66	13.00	2.00	
67	13.00	6.00	
68	13.00	10.00	
69	15.00	.00	S
70	15.00	4.00	
71	15.00	8.00	
72	15.00	10.00	

ELEMENT INCIDENCES

1	1	9	2
2	1	8	9
3	9	8	10
4	8	13	10
5	10	13	14
6	13	15	14
7	14	15	16
8	15	18	16
9	16	18	19
10	18	20	19
11	19	20	21
12	20	26	21
13	21	26	27

14	26	28	27
15	27	28	29
16	28	31	29
17	29	31	32
18	31	33	32
19	32	33	34
20	33	39	34
21	34	39	40
22	40	39	41
23	40	41	42
24	41	44	42
25	42	44	49
26	49	44	48
27	48	44	45
28	48	45	46
29	48	46	47
30	2	9	3
31	3	9	11
32	9	10	11
33	11	10	14
34	11	14	17
35	14	16	17
36	16	19	17
37	17	19	22
38	19	21	22
39	22	21	27
40	22	27	30
41	27	29	30
42	30	29	32
43	30	32	35
44	32	34	35
45	35	34	40
46	35	40	43

47	40	42	43
48	43	42	49
49	43	49	51
50	49	50	51
51	49	48	50
109	48	47	50
52	50	47	55
53	51	50	56
54	56	50	55
55	51	56	58
56	56	57	58
57	55	57	56
58	4	3	12
59	3	11	12
60	12	11	17
61	12	17	23
62	17	22	23
63	23	22	30
64	23	30	36
65	30	35	36
66	36	35	43
67	36	43	52
68	43	51	52
69	52	51	58
70	52	58	60
71	58	59	60
72	58	57	59
73	5	4	12
74	5	12	24
75	12	23	24
76	24	23	36
77	24	36	37
78	37	36	53

```
79 36 52 53
80 53 52 60
81 53 60 61
82 61 60 64
83 64 60 66
84 60 63 66
85 60 59 63
86  6  5 24
87  6 24 25
88 25 24 37
89 37 53 61
90 61 64 67
91 67 64 70
92 64 66 70
93 66 63 69
94  7  6 25
95  7 25 38
96 25 37 38
97 38 37 54
98 54 37 61
99 54 61 65
100 65 61 67
101 65 67 71
102 67 70 71
103 66 69 70
104 38 54 62
105 62 54 65
106 62 65 68
107 68 65 71
108 68 71 72
ELEMENT PROPERTIES
1 TO 109 TYPE 'CSTG' THICKNESS 0.50
CONSTANTS
```

```
E 21100. ALL
POISSON .3 ALL
JOINT RELEASES
1 TO 7 FORCE Y
46 47 55 57 59 63 69 FORCE X
LOADING 'ONE' 'R=0.33'
JOINT LOADS
 1 FORCE Y -125.0
 8 FORCE Y -250.0
13 FORCE Y -250.
15 FORCE Y -250.
18 FORCE Y -125.
LOADING 'TWO' 'R=0.50'
JOINT LOADS
 1 FORCE Y -125.0
 8 FORCE Y -250.0
13 FORCE Y -250.
15 FORCE Y -250.
18 FORCE Y -250.
20 FORCE Y -250.
26 FORCE Y -125.
LOADING 'THREE' 'R=0.66'
JOINT LOADS
 1 FORCE Y -125.0
 8 FORCE Y -250.0
13 FORCE Y -250.
15 FORCE Y -250.
18 FORCE Y -250.
20 FORCE Y -250.
26 FORCE Y -250.
28 FORCE Y -250.
31 FORCE Y -125.
LOADING 'FOUR' 'R=0.83'
```

```
JOINT LOADS
 1 FORCE Y -125.0
 8 FORCE Y -250.0
13 FORCE Y -250.
15 FORCE Y -250.
18 FORCE Y -250.
20 FORCE Y -250.
26 FORCE Y -250.
28 FORCE Y -250.
31 FORCE Y -250.
33 FORCE Y -250.
39 FORCE Y -125.
LOADING 'FIVE' 'R=1.0'
JOINT LOADS
 1 FORCE Y -125.0
 8 FORCE Y -250.0
13 FORCE Y -250.
15 FORCE Y -250.
18 FORCE Y -250.
20 FORCE Y -250.
26 FORCE Y -250.
28 FORCE Y -250.
31 FORCE Y -250.
33 FORCE Y -250.
39 FORCE Y -250.
41 FORCE Y -250.
44 FORCE Y -125.
STIFFNESS ANALYSIS
LIST DISPLACEMENTS STRESSES ALL
```

LOADING - ONE R=0.33

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.4222690	
2	0.0	-0.4100921	
3	0.0	-0.3945534	
4	0.0	-0.3579448	
5	0.0	-0.3129481	
6	0.0	-0.2819735	
7	0.0	-0.2518885	
46	0.1026106	0.0	
47	0.0960766	0.0	
55	0.0858873	0.0	
57	0.0783217	0.0	
59	0.0739172	0.0	
63	0.0700349	0.0	
69	0.0618424	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
8	0.0208431	-0.4164734	
9	0.0073571	-0.4093118	
10	0.0207590	-0.3981020	
11	0.0108859	-0.3816763	
12	-0.0002322	-0.3503858	
13	0.0398991	-0.4012147	
14	0.0322695	-0.3779386	
15	0.0576743	-0.3758704	
16	0.0423164	-0.3461661	
17	0.0207044	-0.3344870	
18	0.0719678	-0.3319695	
19	0.0509313	-0.3058933	
20	0.0808291	-0.2842578	
21	0.0618282	-0.2685195	
22	0.0381340	-0.2694951	
23	0.0102026	-0.2666142	
24	-0.0152860	-0.2525315	
25	-0.0326511	-0.2239708	
26	0.0864744	-0.2517479	
27	0.0688493	-0.2382060	
28	0.0919099	-0.2221598	
29	0.0742089	-0.2083761	
30	0.0489415	-0.2098475	
31	0.0964963	-0.1925613	
32	0.0779532	-0.1782787	
33	0.0999738	-0.1625798	
34	0.0800425	-0.1475771	

35	0.0551697	-0.1487693
36	0.0192374	-0.1536883
37	-0.0281002	-0.1740059
38	-0.0761210	-0.1740729
39	0.1025355	-0.1307027
40	0.0794247	-0.1131014
41	0.1027887	-0.0937753
42	0.0779205	-0.0726691
43	0.0554330	-0.0820109
44	0.0953897	-0.0412979
45	0.0961393	-0.0242994
48	0.0883888	-0.0199576
49	0.0783137	-0.0340411
50	0.0811015	-0.0126461
51	0.0671102	-0.0271538
52	0.0423949	-0.0533026
53	0.0070710	-0.0895838
54	-0.0536738	-0.1160896
56	0.0785494	-0.0080547
58	0.0705171	-0.0131675
60	0.0565080	-0.0161413
61	-0.0138081	-0.0538263
62	-0.0924131	-0.0684252
64	0.0293295	-0.0113002
65	-0.0463891	-0.0210745
66	0.0541091	0.0064169
67	-0.0056101	0.0144127
68	-0.0836563	0.0156761
70	0.0277361	0.0345493
71	-0.0442713	0.0503002
72	-0.0828232	0.0511333

LOADING - TWO R=0.50

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------	DISPLACEMENT	-----------------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.5600443	
2	0.0	-0.5487175	
3	0.0	-0.5341160	
4	0.0	-0.4968480	
5	0.0	-0.4441767	
6	0.0	-0.4043831	
7	0.0	-0.3635858	
46	0.1505420	0.0	
47	0.1407731	0.0	
55	0.1255132	0.0	
57	0.1142317	0.0	
59	0.1077142	0.0	
63	0.1020182	0.0	
69	0.0901737	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/-----------------	DISPLACEMENT	-----------------/
	X DISP.	Y DISP.	Z DISP.

8	0.0240092	-0.5548770
9	0.0093671	-0.5480538
10	0.0269979	-0.5381193
11	0.0174835	-0.5225071
12	0.0041475	-0.4909914
13	0.0461366	-0.5419893
14	0.0436655	-0.5219635
15	0.0673773	-0.5223386
16	0.0591403	-0.4982472
17	0.0367852	-0.4823679
18	0.0875527	-0.4951345
19	0.0727232	-0.4666215
20	0.1068258	-0.4590085
21	0.0847532	-0.4245791
22	0.0541643	-0.4139409
23	0.0166546	-0.3961638
24	-0.0192985	-0.3681605
25	-0.0465881	-0.3250688
26	0.1234638	-0.4041317
27	0.0941743	-0.3718528
28	0.1345595	-0.3424063
29	0.1051054	-0.3185824
30	0.0663843	-0.3199648
31	0.1413316	-0.2929317
32	0.1118622	-0.2703214
33	0.1464692	-0.2456812
34	0.1157232	-0.2225107
35	0.0779863	-0.2242221
36	0.0257905	-0.2310290
37	-0.0396974	-0.2544971
38	-0.1096689	-0.2538066
39	0.1502070	-0.1967560
40	0.1151652	-0.1701306
41	0.1506339	-0.1409023
42	0.1132060	-0.1091548
43	0.0793526	-0.1232304
44	0.1396593	-0.0619599
45	0.1408163	-0.0364460
48	0.1291828	-0.0299026
49	0.1140135	-0.0510181
50	0.1183174	-0.0187874
51	0.0973543	-0.0403723
52	0.0607115	-0.0792472
53	0.0090405	-0.1325048
54	-0.0775533	-0.1698971
56	0.1145430	-0.0119375
58	0.1026067	-0.0195358
60	0.0818811	-0.0238971
61	-0.0204292	-0.0796427
62	-0.1341198	-0.1005465
64	0.0425663	-0.0170955
65	-0.0675377	-0.0317291
66	0.0788043	0.0091050
67	-0.0081999	0.0203308
68	-0.1218780	0.0219496
70	0.0404238	0.0499531
71	-0.0644552	0.0726295
72	-0.1206980	0.0738095

LOADING - THREE R=0.66

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.6690674	
2	0.0	-0.6583131	
3	0.0	-0.6444228	
4	0.0	-0.6077477	
5	0.0	-0.5519304	
6	0.0	-0.5075577	
7	0.0	-0.4591680	
46	0.1948645	0.0	
47	0.1818138	0.0	
55	0.1614171	0.0	
57	0.1464503	0.0	
59	0.1379033	0.0	
63	0.1304640	0.0	
69	0.1154167	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
8	0.0262737	-0.6642418	
9	0.0107030	-0.6576943	
10	0.0310741	-0.6484298	
11	0.0220581	-0.6334952	
12	0.0080292	-0.6030513	
13	0.0507154	-0.6523982	
14	0.0506972	-0.6337957	
15	0.0744208	-0.6346063	
16	0.0694405	-0.6124594	
17	0.0482997	-0.5971370	
18	0.0971520	-0.6106579	
19	0.0870937	-0.5853758	
20	0.1197341	-0.5799558	
21	0.1036490	-0.5503640	
22	0.0703990	-0.5356945	
23	0.0253100	-0.5081715	
24	-0.0203677	-0.4678668	
25	-0.0580115	-0.4127446	
26	0.1420336	-0.5399609	
27	0.1173831	-0.5038961	
28	0.1626024	-0.4876006	
29	0.1284924	-0.4438896	
30	0.0816264	-0.4329308	
31	0.1788607	-0.4144000	
32	0.1367357	-0.3726301	
33	0.1883602	-0.3350195	
34	0.1453409	-0.3018763	
35	0.0957052	-0.3037682	
36	0.0301653	-0.3081198	
37	-0.0487367	-0.3264007	
38	-0.1380879	-0.3240821	
39	0.1937232	-0.2659858	
40	0.1459865	-0.2296998	
41	0.1947548	-0.1895981	
42	0.1441357	-0.1465153	
43	0.0985267	-0.1652556	
44	0.1802178	-0.0829486	
45	0.1818098	-0.0487640	
48	0.1661752	-0.0398991	

49	0.1457031	-0.0681182
50	0.1517542	-0.0246995
51	0.1237822	-0.0531682
52	0.0759425	-0.1043742
53	0.0094247	-0.1726443
54	-0.0980603	-0.2180954
56	0.1468159	-0.0156338
58	0.1311033	-0.0256419
60	0.1039504	-0.0311577
61	-0.0267071	-0.1037567
62	-0.1704425	-0.1297920
64	0.0541130	-0.0228660
65	-0.0862468	-0.0422421
66	0.1006991	0.0112519
67	-0.0105390	0.0248812
68	-0.1557252	0.0265541
70	0.0516888	0.0632212
71	-0.0822977	0.0917142
72	-0.1542785	0.0931610

LOADING - FOUR R=0.83

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
	/----DISPLACEMENT	----/	
1	0.0	-0.7494617	
2	0.0	-0.7390816	
3	0.0	-0.7256556	
4	0.0	-0.6896070	
5	0.0	-0.6329264	
6	0.0	-0.5868462	
7	0.0	-0.5335010	
46	0.2335960	0.0	
47	0.2171218	0.0	
55	0.1915357	0.0	
57	0.1730714	0.0	
59	0.1627676	0.0	
63	0.1537723	0.0	
69	0.1361064	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
	/----DISPLACEMENT	----/	
8	0.0279324	-0.7447788	
9	0.0115967	-0.7384920	
10	0.0337960	-0.7294983	
11	0.0249134	-0.7150527	
12	0.0107061	-0.6854775	
13	0.0541028	-0.7333300	
14	0.0553188	-0.7154046	
15	0.0796946	-0.7160934	
16	0.0761152	-0.6946969	
17	0.0551953	-0.6800324	
18	0.1044236	-0.6927757	
19	0.0959952	-0.6683278	

20	0.1289736	-0.6628358
21	0.1150101	-0.6343141
22	0.0816811	-0.6199796
23	0.0326975	-0.5916207
24	-0.0192568	-0.5448480
25	-0.0664879	-0.4817865
26	0.1529328	-0.6247098
27	0.1321822	-0.5911837
28	0.1754353	-0.5772567
29	0.1469604	-0.5383189
30	0.0985615	-0.5226662
31	0.1959851	-0.5197136
32	0.1583165	-0.4745001
33	0.2142721	-0.4506275
34	0.1660358	-0.3975611
35	0.1090916	-0.3877259
36	0.0348133	-0.3784750
37	-0.0550826	-0.3851390
38	-0.1598517	-0.3805491
39	0.2291063	-0.3568709
40	0.1662737	-0.2993236
41	0.2333664	-0.2435405
42	0.1671818	-0.1864285
43	0.1097060	-0.2091449
44	0.2149425	-0.1048596
45	0.2170081	-0.0615856
48	0.1970206	-0.0501070
49	0.1706110	-0.0856854
50	0.1792170	-0.0302704
51	0.1442784	-0.0654070
52	0.0871217	-0.1283586
53	0.0088350	-0.2074690
54	-0.1140997	-0.2577023
56	0.1733842	-0.0190845
58	0.1542844	-0.0314494
60	0.1213754	-0.0376382
61	-0.0321311	-0.1246034
62	-0.1992714	-0.1543455
64	0.0632851	-0.0282768
65	-0.1013855	-0.0518897
66	0.1185239	0.0127600
67	-0.0124751	0.0278226
68	-0.1831614	0.0292922
70	0.0608798	0.0736052
71	-0.0967325	0.1064537
72	-0.1815396	0.1080755

LOADING - FIVE R=1.0

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------DISPLACEMENT----------------/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.7942944	
2	0.0	-0.7841097	
3	0.0	-0.7709457	
4	0.0	-0.7352850	
5	0.0	-0.6786975	
6	0.0	-0.6324254	
7	0.0	-0.5766222	
46	0.2635514	0.0	

47	0.2422870	0.0
55	0.2115248	0.0
57	0.1901097	0.0
59	0.1784519	0.0
63	0.1683040	0.0
69	0.1489339	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT	-----------------/	
	X DISP.	Y DISP.	Z DISP.
8	0.0288491	-0.7896380	
9	0.0120651	-0.7835274	
10	0.0352106	-0.7745833	
11	0.0263349	-0.7604063	
12	0.0120116	-0.7313383	
13	0.0559538	-0.7782650	
14	0.0576967	-0.7605954	
15	0.0825282	-0.7611200	
16	0.0795026	-0.7399804	
17	0.0585795	-0.7256600	
18	0.1082651	-0.7378531	
19	0.1004301	-0.7136446	
20	0.1337456	-0.7079982	
21	0.1204978	-0.6797959	
22	0.0872757	-0.6656661	
23	0.0367262	-0.6375340	
24	-0.0177071	-0.5890751	
25	-0.0711747	-0.5222666	
26	0.1585137	-0.6702769	
27	0.1388943	-0.6374140	
28	0.1818314	-0.6238536	
29	0.1551004	-0.5859995	
30	0.1073206	-0.5703622	
31	0.2031870	-0.5685631	
32	0.1685314	-0.5255780	
33	0.2229666	-0.5037158	
34	0.1785624	-0.4542704	
35	0.1189623	-0.4402923	
36	0.0395791	-0.4228089	
37	-0.0584130	-0.4206473	
38	-0.1721844	-0.4143061	
39	0.2417359	-0.4225258	
40	0.1799642	-0.3585145	
41	0.2526314	-0.3133646	
42	0.1780539	-0.2320154	
43	0.1145702	-0.2473329	
44	0.2361735	-0.1374790	
45	0.2414064	-0.0793581	
48	0.2158509	-0.0607442	
49	0.1823270	-0.1041241	
50	0.1961287	-0.0348872	
51	0.1557552	-0.0760680	
52	0.0925859	-0.1469355	
53	0.0084143	-0.2302537	
54	-0.1233627	-0.2819826	
56	0.1902069	-0.0219096	
58	0.1684752	-0.0359211	
60	0.1315160	-0.0421799	
61	-0.0354800	-0.1381562	
62	-0.2162156	-0.1697792	
64	0.0687336	-0.0321629	

65	-0.1104512	-0.0585339
66	0.1294749	0.0135181
67	-0.0136140	0.0290288
68	-0.1996817	0.0302217
70	0.0665646	0.0796388
71	-0.1053854	0.1148155
72	-0.1979838	0.1165134

APPENDIX 4

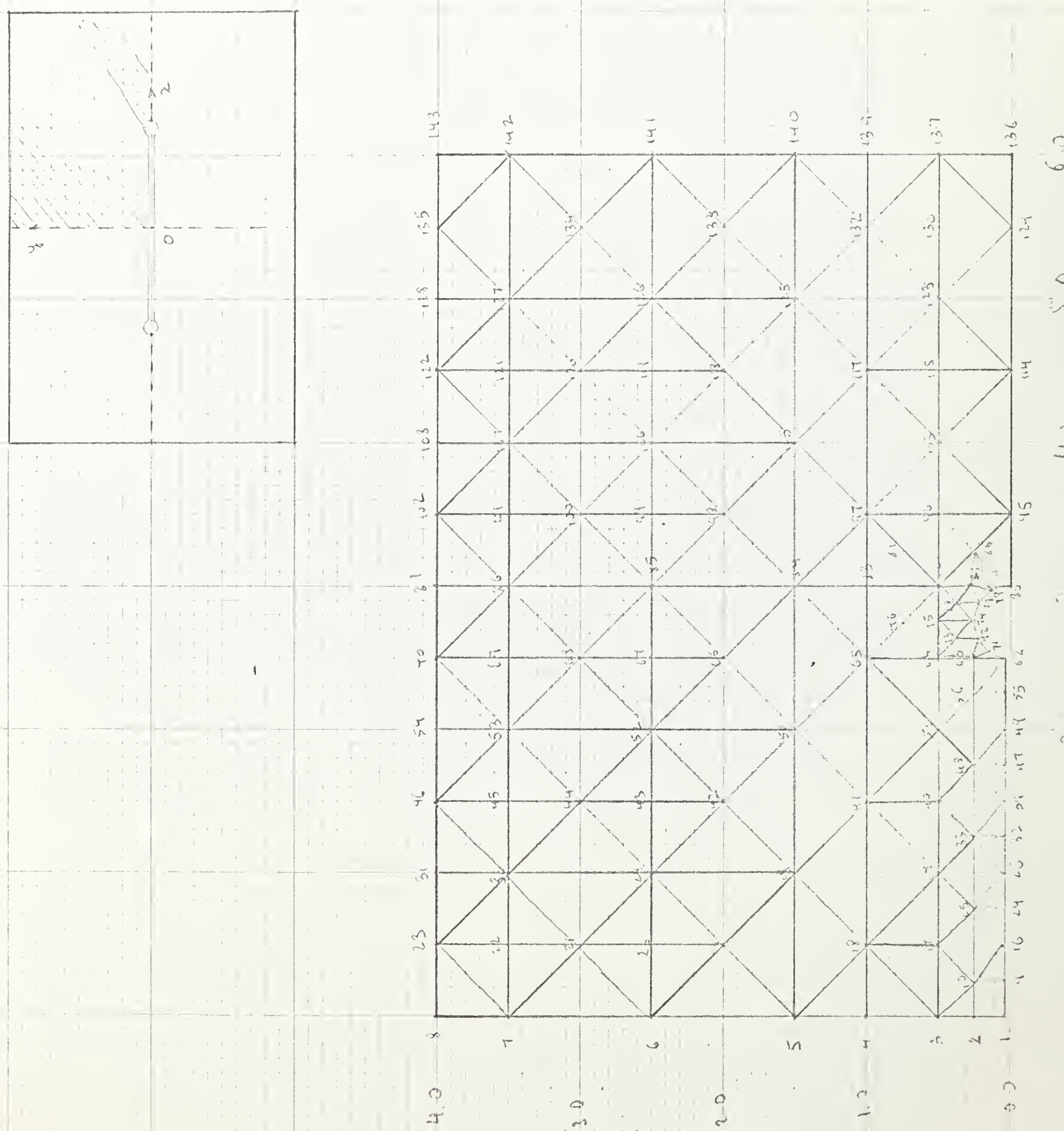
Straight slit with circled ends , 'CSTG' type .

The following presents :

1- Plate division , the numbers are node names , page 141 .

2- Input data , pp 142 - 152 .

3- Output data , pp 153 - 163 .



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        APPENDIX 4  'STRAIGHT SLIT WITH CIRCLED ENDS'
        'CSIG' TYPE
        TYPE PLANE STRESS
        UNITS INCHES
        UNITS POUNDS
  JOINT COORDINATES
     1 0.00 0.03125 S
     2 0.00 0.25 S
     3 0.00 0.50 S
     4 0.00 1.00 S
     5 0.00 1.50 S
     6 0.00 2.50 S
     7 0.00 3.50 S
     8 0.00 4.00 S
     9 0.25 0.03125
    10 0.25 0.25
    16 0.50 0.03125
    17 0.50 0.50
    18 0.50 1.00
    19 0.50 2.00
    20 0.50 2.50
    21 0.50 3.00
    22 0.50 3.50
    23 0.50 4.00
    24 0.75 0.03125
    25 0.75 0.25
    26 1.00 0.03125
```

27 1.00 0.50

28 1.00 1.50

29 1.00 2.50

30 1.00 3.50

31 1.00 4.00

32 1.25 0.03125

33 1.25 0.25

39 1.50 0.03125

40 1.50 0.50

41 1.50 1.00

42 1.50 2.00

43 1.50 2.50

44 1.50 3.00

45 1.50 3.50

46 1.50 4.00

47 1.75 0.03125

48 1.75 0.25

49 2.00 0.03125

50 2.00 0.50

51 2.00 1.50

52 2.00 2.50

53 2.00 3.50

54 2.00 4.00

55 2.25 0.03125

56 2.25 0.25

62 2.503 0.03125

63 2.50 0.25

64 2.50 0.50

65 2.50 1.00

66 2.50 2.00

67 2.50 2.50

68 2.50 3.00

69 2.50 3.50

70 2.50 4.00
71 2.552 0.15
72 2.640 0.224
73 2.625 0.375
74 2.75 0.25
75 2.75 0.50
76 2.75 0.75
77 2.87 0.22
78 2.875 0.375
79 2.97 0.12
80 3.00 0.00 S
81 3.00 0.25
82 3.00 0.50
83 3.00 1.00
84 3.00 1.50
85 3.00 2.50
86 3.00 3.50
87 3.00 4.00
88 3.25 0.25
89 3.25 0.75
95 3.50 0.00 S
96 3.50 0.50
97 3.50 1.00
98 3.50 2.00
99 3.50 2.50
100 3.50 3.00
101 3.50 3.50
102 3.50 4.00
103 4.00 0.50
105 4.00 1.50
106 4.00 2.50
107 4.00 3.50
108 4.00 4.00

```
114 4.50 0.00 S
115 4.50 0.50
117 4.50 1.00
118 4.50 2.00
119 4.50 2.50
120 4.50 3.00
121 4.50 3.50
122 4.50 4.00
123 5.00 0.50
125 5.00 1.50
126 5.00 2.50
127 5.00 3.50
128 5.00 4.00
129 5.50 0.00 S
130 5.50 0.50
132 5.50 1.00
133 5.50 2.00
134 5.50 3.00
135 5.50 4.00
136 6.00 0.00 S
137 6.00 0.50
139 6.00 1.00
140 6.00 1.50
141 6.00 2.50
142 6.00 3.50
143 6.00 4.00
ELEMENT INCIDENCES
   1   2   1  10
   2   1   9  10
   3  10   9  16
   4  10  16  25
   5  16  24  25
   6  25  24  26
```

7	25	26	33
8	26	32	33
9	33	32	39
10	33	39	48
11	39	47	48
12	48	47	49
13	48	49	56
14	49	55	56
15	56	55	62
16	56	62	63
17	63	62	71
18	63	71	72
19	63	72	73
20	73	72	74
21	73	74	75
22	75	74	78
23	74	77	78
24	78	77	81
25	77	79	81
26	81	79	88
27	79	80	88
28	80	95	88
29	3	2	10
30	3	10	17
31	10	25	17
32	17	25	27
33	25	33	27
34	27	33	40
35	33	48	40
36	40	48	50
37	48	56	50
38	50	56	64
39	56	63	64

40	64	63	73
41	64	73	75
42	75	78	82
43	78	81	82
44	82	81	88
45	82	88	96
46	88	95	96
47	4	3	18
48	3	17	18
49	18	17	27
50	18	27	41
51	27	40	41
52	41	40	50
53	41	50	65
54	50	64	65
55	65	64	76
56	64	75	76
57	76	75	82
58	65	76	83
59	76	82	83
60	83	82	89
61	82	96	89
62	83	89	97
63	89	96	97
64	97	96	103
65	96	95	103
66	97	103	117
67	95	114	103
68	103	115	117
69	103	114	115
70	117	115	123
71	115	114	123
72	117	123	132

73	114	129	123
74	123	130	132
75	123	129	130
76	132	130	137
77	130	129	137
78	132	137	139
79	129	136	137
80	5	4	18
81	5	18	28
82	18	41	28
83	28	41	51
84	41	65	51
85	51	65	84
86	65	83	84
87	84	83	97
88	84	97	105
89	97	117	105
90	105	117	125
91	117	132	125
92	125	132	140
93	132	139	140
94	6	5	19
95	5	28	19
96	19	28	29
97	6	19	20
98	20	19	29
99	29	28	42
100	29	42	43
101	43	42	52
102	28	51	42
103	42	51	52
104	52	51	66
105	52	66	67

106	67	66	85
107	51	84	66
108	66	84	85
109	85	84	98
110	85	98	99
111	99	98	106
112	84	105	98
113	98	105	106
114	106	105	118
115	106	118	119
116	119	118	126
117	105	125	118
118	118	125	126
119	126	125	133
120	126	133	141
121	125	140	133
122	133	140	141
123	7	6	21
124	7	21	22
125	6	20	21
126	22	21	30
127	21	20	29
128	21	29	30
129	30	29	44
130	30	44	45
131	29	43	44
132	45	44	53
133	44	43	52
134	44	52	53
135	53	52	68
136	53	68	69
137	52	67	68
138	69	68	86

139	68	85	86
140	68	67	85
141	86	85	100
142	86	100	101
143	85	99	100
144	101	100	107
145	100	99	106
146	100	106	107
147	107	106	120
148	107	120	121
149	106	119	120
150	121	120	127
151	120	119	126
152	120	126	127
153	127	126	134
154	127	134	142
155	126	141	134
156	134	141	142
157	8	7	23
158	7	22	23
159	23	22	30
160	23	30	31
161	31	30	46
162	30	45	46
163	46	45	53
164	46	53	54
165	54	53	70
166	53	69	70
167	70	69	86
168	70	86	87
169	87	86	102
170	86	101	102
171	102	101	107

```
172 102 107 108
173 108 107 122
174 107 121 122
175 122 121 127
176 122 127 128
177 128 127 135
178 127 142 135
179 135 142 143
ELEMENT PROPERTIES
1 TO 179 TYPE 'CSTG' THICKNESS 0.10
CONSTANTS
E 30000. ALL
POISSON 0.3 ALL
JOINT RELEASES
1 TO 8 FORCE Y
80 95 114 129 136 FORCE X
$ PLATE LENGTH LO=12, WIDTH WO=8,WELD WIDTH W=1/16, WELD LENGTH CENTER
$ TO CENTER L=5.5, END CIRCLE DIAMETER=0.50, SAW CUT WIDTH WS=1/32,
$ SIGMAO=8*10**4
LOADING 'ONE' 'X=0.20'
JOINT LOADS
  1 FORCE Y -1.00
  9 FORCE Y -2.00
 16 FORCE Y -1.00
LOADING 'TWO' 'X=0.40'
JOINT LOADS
  1 FORCE Y -1.00
  9 FORCE Y -2.00
 16 FORCE Y -2.00
 24 FORCE Y -2.00
 26 FORCE Y -1.00
LOADING 'THREE' 'X=0.60'
JOINT LOADS
```

```
  1 FORCE Y -1.00
  9 FORCE Y -2.00
 16 FORCE Y -2.00
 24 FORCE Y -2.00
 26 FORCE Y -2.00
 32 FORCE Y -2.00
 39 FORCE Y -1.00
LOADING 'FOUR' 'X=0.80'
JOINT LOADS
  1 FORCE Y -1.00
  9 FORCE Y -2.00
 16 FORCE Y -2.00
 24 FORCE Y -2.00
 26 FORCE Y -2.00
 32 FORCE Y -2.00
 39 FORCE Y -2.00
 47 FORCE Y -2.00
 49 FORCE Y -1.00
LOADING 'FIVE' 'X=1.00'
JOINT LOADS
  1 FORCE Y -1.00
  9 FORCE Y -2.00
 16 FORCE Y -2.00
 24 FORCE Y -2.00
 26 FORCE Y -2.00
 32 FORCE Y -2.00
 39 FORCE Y -2.00
 47 FORCE Y -2.00
 49 FORCE Y -2.00
 55 FORCE Y -2.00
 62 FORCE Y -1.00
          DUMP TIME
          TIME BEGIN
```

LOADING - ONE X=0.20

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0086755	
2	0.0	-0.0082036	
3	0.0	-0.0078239	
4	0.0	-0.0070758	
5	0.0	-0.0066254	
6	0.0	-0.0058597	
7	0.0	-0.0055113	
8	0.0	-0.0053223	
80	0.0017814	0.0	
95	0.0016919	0.0	
114	0.0014933	0.0	
129	0.0013662	0.0	
136	0.0012693	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0005557	-0.0083067	
10	0.0002291	-0.0079604	
16	0.0009274	-0.0074691	
17	0.0002137	-0.0070741	
18	-0.0000497	-0.0066503	
19	-0.0001827	-0.0059258	
20	-0.0002045	-0.0056892	
21	-0.0002943	-0.0055396	
22	-0.0003790	-0.0053648	
23	-0.0005535	-0.0052567	
24	0.0012744	-0.0065069	
25	0.0007213	-0.0065401	
26	0.0014718	-0.0058308	
27	0.0005111	-0.0058841	
28	-0.0001555	-0.0056535	
29	-0.0003852	-0.0052698	
30	-0.0007266	-0.0050276	
31	-0.0010494	-0.0048734	
32	0.0016362	-0.0052131	
33	0.0011581	-0.0052435	
39	0.0017694	-0.0046604	
40	0.0008691	-0.0047322	
41	0.0002667	-0.0047954	
42	-0.0003452	-0.0046974	
43	-0.0004992	-0.0046137	
44	-0.0007598	-0.0045643	
45	-0.0010134	-0.0044638	
46	-0.0014693	-0.0043937	

47	0.0018968	-0.0041231
48	0.0014432	-0.0041555
49	0.0020039	-0.0035730
50	0.0010720	-0.0036380
51	-0.0000325	-0.0037827
52	-0.0005760	-0.0038597
53	-0.0012293	-0.0038132
54	-0.0017601	-0.0037361
55	0.0020906	-0.0030127
56	0.0016213	-0.0030352
62	0.0021477	-0.0024177
63	0.0016731	-0.0024355
64	0.0011764	-0.0024674
65	0.0005213	-0.0026032
66	-0.0002759	-0.0029503
67	-0.0005766	-0.0030299
68	-0.0009712	-0.0030872
69	-0.0013669	-0.0030747
70	-0.0019528	-0.0030519
71	0.0018989	-0.0023002
72	0.0017520	-0.0020467
73	0.0014234	-0.0020899
74	0.0016656	-0.0016660
75	0.0011952	-0.0017458
76	0.0008661	-0.0018929
77	0.0016692	-0.0011422
78	0.0013886	-0.0012558
79	0.0016642	-0.0004526
81	0.0015838	-0.0006717
82	0.0012462	-0.0010315
83	0.0007027	-0.0015287
84	0.0002286	-0.0018316
85	-0.0005444	-0.0022636
86	-0.0014379	-0.0023653
87	-0.0020281	-0.0023572
88	0.0016225	-0.0003506
89	0.0010666	-0.0009416
96	0.0013840	-0.0004082
97	0.0008943	-0.0008238
98	-0.0000371	-0.0014264
99	-0.0004874	-0.0015585
100	-0.0009653	-0.0016495
101	-0.0014567	-0.0016839
102	-0.0020403	-0.0016910
103	0.0014261	-0.0002010
105	0.0005453	-0.0006334
106	-0.0004208	-0.0009711
107	-0.0014433	-0.0010809
108	-0.0020034	-0.0010996
115	0.0013505	-0.0000758
117	0.0010433	-0.0001484
118	0.0001464	-0.0003826
119	-0.0003745	-0.0004566
120	-0.0008872	-0.0005075
121	-0.0014202	-0.0005336
122	-0.0019571	-0.0005439
123	0.0013325	0.0000399
125	0.0006534	0.0000422
126	-0.0003311	-0.0000085
127	-0.0013957	-0.0000317
128	-0.0019226	-0.0000395
130	0.0012543	0.0001340
132	0.0010208	0.0002553
133	0.0001835	0.0004062
134	-0.0008477	0.0004573
135	-0.0019035	0.0004661

137	0.0012187	0.0002641
139	0.0009476	0.0004913
140	0.0006054	0.0006691
141	-0.0003281	0.0008972
142	-0.0013805	0.0009662
143	-0.0018995	0.0009702

LOADING - TWO X=0.40

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/------------------DISPLACEMENT------------------/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0151012	
2	0.0	-0.0146947	
3	0.0	-0.0143387	
4	0.0	-0.0133415	
5	0.0	-0.0127092	
6	0.0	-0.0113659	
7	0.0	-0.0107165	
8	0.0	-0.0103543	
80	0.0034995	0.0	
95	0.0033222	0.0	
114	0.0029303	0.0	
129	0.0026812	0.0	
136	0.0024917	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT------------------/		
	X DISP.	Y DISP.	Z DISP.
9	0.0007839	-0.0148300	
10	0.0005129	-0.0145293	
16	0.0014993	-0.0143104	
17	0.0005640	-0.0135479	
18	0.0000711	-0.0128202	
19	-0.0003118	-0.0114891	
20	-0.0003825	-0.0110490	
21	-0.0005600	-0.0107711	
22	-0.0007291	-0.0104380	
23	-0.0010632	-0.0102326	
24	0.0021774	-0.0134848	
25	0.0013916	-0.0131850	
26	0.0026910	-0.0121029	
27	0.0010081	-0.0117723	
28	-0.0002298	-0.0110299	
29	-0.0007277	-0.0102682	
30	-0.0014003	-0.0098004	
31	-0.0020206	-0.0095018	
32	0.0031542	-0.0106014	
33	0.0021583	-0.0106590	
39	0.0034535	-0.0094169	
40	0.0016498	-0.0095367	
41	0.0005042	-0.0095675	
42	-0.0006418	-0.0092010	
43	-0.0009539	-0.0090272	
44	-0.0014622	-0.0089240	

157

45	-0.0019590	-0.0087250
46	-0.0028369	-0.0085870
47	0.0037241	-0.0082844
48	0.0027935	-0.0083477
49	0.0039416	-0.0071571
50	0.0020568	-0.0072838
51	-0.0000811	-0.0075158
52	-0.0011113	-0.0075843
53	-0.0023843	-0.0074752
54	-0.0034105	-0.0073214
55	0.0041166	-0.0060183
56	0.0031678	-0.0060622
62	0.0042304	-0.0048188
63	0.0032760	-0.0048557
64	0.0022834	-0.0049191
65	0.0009915	-0.0051860
66	-0.0005574	-0.0058390
67	-0.0011262	-0.0059767
68	-0.0018920	-0.0060770
69	-0.0026595	-0.0060464
70	-0.0037968	-0.0059993
71	0.0037299	-0.0045838
72	0.0034359	-0.0040770
73	0.0027794	-0.0041640
74	0.0032651	-0.0033173
75	0.0023268	-0.0034769
76	0.0016752	-0.0037697
77	0.0032742	-0.0022734
78	0.0027145	-0.0024996
79	0.0032660	-0.0009005
81	0.0031049	-0.0013364
82	0.0024320	-0.0020521
83	0.0013565	-0.0030386
84	0.0004252	-0.0036344
85	-0.0010721	-0.0044760
86	-0.0028054	-0.0046649
87	-0.0039553	-0.0046452
88	0.0031834	-0.0006969
89	0.0020792	-0.0018719
96	0.0027104	-0.0008109
97	0.0017405	-0.0016368
98	-0.0000853	-0.0028302
99	-0.0009611	-0.0030884
100	-0.0018924	-0.0032659
101	-0.0028484	-0.0033307
102	-0.0039891	-0.0033430
103	0.0027961	-0.0003999
105	0.0010593	-0.0012608
106	-0.0008308	-0.0019313
107	-0.0028267	-0.0021470
108	-0.0039237	-0.0021818
115	0.0026483	-0.0001529
117	0.0020424	-0.0002991
118	0.0002820	-0.0007689
119	-0.0007384	-0.0009167
120	-0.0017415	-0.0010183
121	-0.0027841	-0.0010696
122	-0.0038376	-0.0010894
123	0.0026137	0.0000752
125	0.0012785	0.0000724
126	-0.0006520	-0.0000339
127	-0.0027377	-0.0000819
128	-0.0037719	-0.0000971
130	0.0024611	0.0002599
132	0.0020017	0.0004948
133	0.0003583	0.0007841

134	-0.0016639	0.0008739
135	-0.0037352	0.0008963
137	0.0023921	0.0005157
139	0.0018591	0.0009584
140	0.0011871	0.0013040
141	-0.0006444	0.0017462
142	-0.0027086	0.0018790
143	-0.0037275	0.0018867

LOADING - THREE X=0.60

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/------------------DISPLACEMENT------------------/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0202986	
2	0.0	-0.0199403	
3	0.0	-0.0196314	
4	0.0	-0.0186197	
5	0.0	-0.0179556	
6	0.0	-0.0162740	
7	0.0	-0.0153912	
8	0.0	-0.0148808	
80	0.0050955	0.0	
95	0.0048344	0.0	
114	0.0042605	0.0	
129	0.0038987	0.0	
136	0.0036246	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT------------------/		
	X DISP.	Y DISP.	Z DISP.
9	0.0009406	-0.0200500	
10	0.0006927	-0.0197869	
16	0.0018248	-0.0195905	
17	0.0008964	-0.0188825	
18	0.0002702	-0.0181233	
19	-0.0003718	-0.0164386	
20	-0.0005213	-0.0158433	
21	-0.0007814	-0.0154684	
22	-0.0010316	-0.0150027	
23	-0.0015021	-0.0147101	
24	0.0026794	-0.0188715	
25	0.0019741	-0.0185984	
26	0.0034844	-0.0178546	
27	0.0016314	-0.0171300	
28	-0.0001944	-0.0158856	
29	-0.0010039	-0.0147830	
30	-0.0019862	-0.0141194	
31	-0.0028629	-0.0136935	
32	0.0042462	-0.0165325	
33	0.0030331	-0.0162534	
39	0.0048382	-0.0146572	
40	0.0023308	-0.0144031	
41	0.0007714	-0.0141486	
42	-0.0008574	-0.0133323	

43	-0.0013345	-0.0130647
44	-0.0020685	-0.0129050
45	-0.0027893	-0.0126138
46	-0.0040336	-0.0124133
47	0.0053890	-0.0126354
48	0.0039242	-0.0127262
49	0.0057469	-0.0109264
50	0.0028608	-0.0109711
51	-0.0001246	-0.0110854
52	-0.0015752	-0.0110381
53	-0.0034092	-0.0108492
54	-0.0048714	-0.0106215
55	0.0060181	-0.0090289
56	0.0045528	-0.0090884
62	0.0061854	-0.0071927
63	0.0047331	-0.0072536
64	0.0032493	-0.0073499
65	0.0013685	-0.0077345
66	-0.0008290	-0.0085799
67	-0.0016211	-0.0087458
68	-0.0027189	-0.0088690
69	-0.0038187	-0.0088134
70	-0.0054471	-0.0087403
71	0.0054235	-0.0068409
72	0.0049809	-0.0060813
73	0.0039990	-0.0062149
74	0.0047324	-0.0049455
75	0.0033316	-0.0051854
76	0.0023739	-0.0056214
77	0.0047531	-0.0033870
78	0.0039162	-0.0037249
79	0.0047465	-0.0013406
81	0.0045035	-0.0019895
82	0.0034994	-0.0030551
83	0.0019190	-0.0045163
84	0.0005681	-0.0053844
85	-0.0015601	-0.0065760
86	-0.0040432	-0.0068281
87	-0.0056978	-0.0067920
88	0.0046255	-0.0010355
89	0.0029886	-0.0027834
96	0.0039264	-0.0012042
97	0.0024965	-0.0024303
98	-0.0001514	-0.0041865
99	-0.0014043	-0.0045553
100	-0.0027448	-0.0048086
101	-0.0041179	-0.0048967
102	-0.0057665	-0.0049111
103	0.0040597	-0.0005953
105	0.0015152	-0.0018743
106	-0.0012179	-0.0028644
107	-0.0040962	-0.0031761
108	-0.0056862	-0.0032225
115	0.0038459	-0.0002315
117	0.0029583	-0.0004525
118	0.0003979	-0.0011583
119	-0.0010807	-0.0013781
120	-0.0025323	-0.0015295
121	-0.0040404	-0.0016035
122	-0.0055710	-0.0016314
123	0.0037977	0.0001024
125	0.0018500	0.0000819
126	-0.0009531	-0.0000876
127	-0.0039766	-0.0001625
128	-0.0054800	-0.0001840
130	0.0035772	0.0003711

132	0.0029067	0.0007058
133	0.0005169	0.0011111
134	-0.0024194	0.0012404
135	-0.0054286	0.0012624
137	0.0034790	0.0007439
139	0.0027017	0.0013808
140	0.0017236	0.0018758
141	-0.0009379	0.0025061
142	-0.0039361	0.0026935
143	-0.0054178	0.0027042

LOADING - FOUR X=0.80

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/------------------	DISPLACEMENT------------------	/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0244147	
2	0.0	-0.0240904	
3	0.0	-0.0238209	
4	0.0	-0.0228374	
5	0.0	-0.0221868	
6	0.0	-0.0203627	
7	0.0	-0.0193178	
8	0.0	-0.0186908	
80	0.0065100	0.0	
95	0.0061686	0.0	
114	0.0054280	0.0	
129	0.0049665	0.0	
136	0.0046197	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------	DISPLACEMENT------------------	/
	X DISP.	Y DISP.	Z DISP.
9	0.0010618	-0.0241684	
10	0.0008188	-0.0239363	
16	0.0020667	-0.0237171	
17	0.0011415	-0.0230710	
18	0.0004397	-0.0223618	
19	-0.0003785	-0.0205501	
20	-0.0006178	-0.0198514	
21	-0.0009501	-0.0194126	
22	-0.0012730	-0.0188451	
23	-0.0018505	-0.0184853	
24	0.0030363	-0.0230232	
25	0.0023627	-0.0227746	
26	0.0039702	-0.0220878	
27	0.0021533	-0.0213924	
28	-0.0000820	-0.0199638	
29	-0.0012030	-0.0185974	
30	-0.0024569	-0.0177790	
31	-0.0035374	-0.0172494	
32	0.0048848	-0.0208813	
33	0.0037392	-0.0206288	
39	0.0057470	-0.0193380	
40	0.0030024	-0.0187010	

41	0.0011181	-0.0181526
42	-0.0009803	-0.0168801
43	-0.0016229	-0.0165251
44	-0.0025498	-0.0163125
45	-0.0034636	-0.0159419
46	-0.0050016	-0.0156880
47	0.0065620	-0.0174525
48	0.0048522	-0.0171965
49	0.0071682	-0.0149079
50	0.0035032	-0.0146200
51	-0.0001187	-0.0142730
52	-0.0019432	-0.0140460
53	-0.0042518	-0.0137714
54	-0.0060692	-0.0134774
55	0.0076665	-0.0121742
56	0.0056342	-0.0122458
62	0.0079155	-0.0096045
63	0.0059362	-0.0096949
64	0.0039989	-0.0098115
65	0.0016314	-0.0102026
66	-0.0010567	-0.0110330
67	-0.0020300	-0.0112014
68	-0.0034060	-0.0113295
69	-0.0047845	-0.0112441
70	-0.0068187	-0.0111447
71	0.0068791	-0.0091287
72	0.0062965	-0.0080998
73	0.0049578	-0.0082849
74	0.0059906	-0.0065743
75	0.0041352	-0.0068878
76	0.0029001	-0.0074457
77	0.0060391	-0.0044920
78	0.0049217	-0.0049416
79	0.0060445	-0.0017741
81	0.0057145	-0.0026326
82	0.0043785	-0.0040408
83	0.0023492	-0.0059478
84	0.0006445	-0.0070434
85	-0.0019759	-0.0084718
86	-0.0050878	-0.0087566
87	-0.0071658	-0.0087000
88	0.0058877	-0.0013638
89	0.0037405	-0.0036701
96	0.0049743	-0.0015822
97	0.0031170	-0.0031924
98	-0.0002379	-0.0054542
99	-0.0017932	-0.0059049
100	-0.0034780	-0.0062148
101	-0.0052009	-0.0063164
102	-0.0072822	-0.0063293
103	0.0051617	-0.0007837
105	0.0018858	-0.0024591
106	-0.0015652	-0.0037406
107	-0.0051887	-0.0041297
108	-0.0072034	-0.0041820
115	0.0048910	-0.0003105
117	0.0037469	-0.0006057
118	0.0004860	-0.0015436
119	-0.0013868	-0.0018305
120	-0.0032228	-0.0020280
121	-0.0051281	-0.0021294
122	-0.0070735	-0.0021541
123	0.0048327	0.0001189
125	0.0023405	0.0000654
126	-0.0012214	-0.0001758
127	-0.0050534	-0.0002790

128	-0.0069654	-0.0003054
130	0.0045544	0.0004614
132	0.0036953	0.0008759
133	0.0006517	0.0013659
134	-0.0030788	0.0015135
135	-0.0069034	0.0015383
137	0.0044325	0.0009377
139	0.0034385	0.0017369
140	0.0021910	0.0023544
141	-0.0011951	0.0031349
142	-0.0050048	0.0033630
143	-0.0068905	0.0033759

LOADING - FIVE X=1.00

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/------------------DISPLACEMENT	------------------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0274214	
2	0.0	-0.0271190	
3	0.0	-0.0268762	
4	0.0	-0.0259201	
5	0.0	-0.0252945	
6	0.0	-0.0234314	
7	0.0	-0.0222915	
8	0.0	-0.0215839	
80	0.0077067	0.0	
95	0.0072821	0.0	
114	0.0063898	0.0	
129	0.0058441	0.0	
136	0.0054397	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT	------------------/	
	X DISP.	Y DISP.	Z DISP.
9	0.0011461	-0.0271725	
10	0.0009015	-0.0269625	
16	0.0022346	-0.0267184	
17	0.0012983	-0.0261153	
18	0.0005569	-0.0254478	
19	-0.0003654	-0.0236230	
20	-0.0006751	-0.0228694	
21	-0.0010624	-0.0223979	
22	-0.0014423	-0.0217626	
23	-0.0020933	-0.0213563	
24	0.0032873	-0.0260214	
25	0.0026112	-0.0257943	
26	0.0043052	-0.0250864	
27	0.0024800	-0.0244409	
28	0.0000386	-0.0230119	
29	-0.0013232	-0.0215016	
30	-0.0027897	-0.0205796	
31	-0.0040122	-0.0199755	
32	0.0053019	-0.0239905	
33	0.0041704	-0.0236566	

161

39	0.0062528	-0.0223857
40	0.0034966	-0.0217711
41	0.0014470	-0.0211715
42	-0.0010188	-0.0196291
43	-0.0018087	-0.0192055
44	-0.0028834	-0.0189515
45	-0.0039464	-0.0185211
46	-0.0056914	-0.0182270
47	0.0071536	-0.0205870
48	0.0055218	-0.0203332
49	0.0079422	-0.0183751
50	0.0041368	-0.0176579
51	-0.0000418	-0.0168380
52	-0.0021946	-0.0164252
53	-0.0048642	-0.0160729
54	-0.0069380	-0.0157253
55	0.0085746	-0.0158548
56	0.0064363	-0.0155228
62	0.0089579	-0.0128241
63	0.0067741	-0.0125142
64	0.0045203	-0.0123760
65	0.0018545	-0.0124309
66	-0.0012046	-0.0130411
67	-0.0023215	-0.0131926
68	-0.0039087	-0.0133123
69	-0.0054993	-0.0131958
70	-0.0078321	-0.0130725
71	0.0078276	-0.0118948
72	0.0072630	-0.0103808
73	0.0056797	-0.0105383
74	0.0069484	-0.0083265
75	0.0046723	-0.0086554
76	0.0032263	-0.0092298
77	0.0070752	-0.0056405
78	0.0056551	-0.0062055
79	0.0071175	-0.0022141
81	0.0066833	-0.0032830
82	0.0050001	-0.0050272
83	0.0026456	-0.0073037
84	0.0006765	-0.0085284
85	-0.0022838	-0.0100514
86	-0.0058746	-0.0103379
87	-0.0082714	-0.0102587
88	0.0069250	-0.0016808
89	0.0042948	-0.0045269
96	0.0058093	-0.0019344
97	0.0035745	-0.0038999
98	-0.0003256	-0.0065647
99	-0.0020942	-0.0070612
100	-0.0040412	-0.0074034
101	-0.0060293	-0.0075079
102	-0.0084436	-0.0075159
103	0.0060597	-0.0009577
105	0.0021622	-0.0029911
106	-0.0018421	-0.0045118
107	-0.0060347	-0.0049536
108	-0.0083819	-0.0050054
115	0.0057440	-0.0003862
117	0.0043802	-0.0007511
118	0.0005517	-0.0019060
119	-0.0016293	-0.0022495
120	-0.0037652	-0.0024859
121	-0.0059779	-0.0025911
122	-0.0082525	-0.0026278
123	0.0056797	0.0001246
125	0.0027359	0.0000244

126	-0.0014325	-0.0002934
127	-0.0058995	-0.0004245
128	-0.0081370	-0.0004538
130	0.0053559	0.0005267
132	0.0043393	0.0009975
133	0.0007668	0.0015360
134	-0.0035964	0.0016850
135	-0.0080694	0.0017098
137	0.0052170	0.0010881
139	0.0040437	0.0020099
140	0.0025765	0.0027162
141	-0.0013914	0.0036002
142	-0.0058469	0.0038523
143	-0.0080554	0.0038663

APPENDIX 5

Straight slit with circled ends , 'LST' type .

The following presents :

1- Input data , pp 165 - 185 .

2- Output data , pp 186 - 218 .

```
APPENDIX 5  'STRAIGHT SLIT WITH CIRCLED ENDS'
'LST' TYPE
TYPE PLANE STRESS
UNITS INCHES
UNITS POUNDS
JOINT COORDINATES
    1 0.00 0.03125 S
525 S
    2 0.00 0.25 S
526 S
    3 0.00 0.50 S
527 S
    4 0.00 1.00 S
528 S
    5 0.00 1.50 S
529 S
    6 0.00 2.50 S
530 S
    7 0.00 3.50 S
531 S
    8 0.00 4.00 S
147
148
149
150
    9 0.25 0.03125
151
   10 0.25 0.25
```

152
153
154
155
156
157
158
159
160
161
162
163
164
165
166
16 0.50 0.03125
171
17 0.50 0.50
172
18 0.50 1.00
173
19 0.50 2.00
174
20 0.50 2.50
175
21 0.50 3.00
176
22 0.50 3.50
177
23 0.50 4.00
178
179
180

24 0.75 C.C3125
181
25 0.75 C.25
182
183
184
185
186
187
188
189
190
191
192
193
194
195
26 1.0C C.C3125
196
27 1.00 0.50
197
28 1.00 1.50
198
29 1.00 2.50
199
30 1.00 3.50
200
31 1.00 4.00
201
202
203
32 1.25 C.C3125
204

33 1.25 C.25
205
206
207
208
209
210
211
212
213
214
215
216
217
218
39 1.50 C.03125
223
40 1.50 C.5C
224
41 1.50 1.00
225
42 1.50 2.00
226
43 1.50 2.50
227
44 1.50 3.00
228
45 1.50 3.50
229
46 1.50 4.00
300
301
302

47 1.75 C.C3125

303

48 1.75 C.25

304

305

306

307

308

309

310

311

312

313

314

315

316

317

49 2.0C C.C3125

318

5C 2.CC 0.50

319

51 2.00 1.50

320

52 2.00 2.50

321

53 2.00 3.50

322

54 2.CC 4.CC

323

324

325

55 2.25 0.C3125

326

56 2.25 C.25

327

328

329

330

331

332

333

334

335

336

337

338

339

340

341

62 2.503 0.03125

346

63 2.50 C.25

347

64 2.5C C.50

348

65 2.50 1.00

370

66 2.50 2.00

349

67 2.50 2.50

350

68 2.50 3.00

351

69 2.50 3.50

352

70 2.50 4.00

353

354

71 2.552 0.15

355

356

357

358

72 2.640 0.224

359

73 2.625 0.375

360

361

362

363

364

365

74 2.75 0.25

366

75 2.75 0.50

367

76 2.75 0.75

368

369

371

372

373

374

375

376

377

378

379

380

381

77 2.87 C.22

382

78 2.875 C.375

383

384

385

386

387

388

389

79 2.97 0.12

397

390

80 3.00 0.00 S

81 3.CC C.25

391

82 3.00 0.50

392

83 3.0C 1.C0

393

84 3.00 1.5C

394

85 3.CC 2.5C

395

86 3.00 3.5C

396

87 3.00 4.00

398

399

400

401

402

403
404 S
88 3.25 0.25
405
89 3.25 0.75
406
407
408
409
410
411
412
413
414
415
420
421
422
423
95 3.50 0.00 S
424
96 3.50 0.50
425
97 3.50 1.00
426
98 3.50 2.00
427
99 3.50 2.50
428
100 3.50 3.00
429
101 3.50 3.50
430

102 3.50 4.00
431
432
433
434
435
436
437
438
439
440
441
442
443 S
103 4.00 0.50
444
105 4.CC 1.5C
445
106 4.CC 2.50
446
107 4.00 3.50
447
108 4.00 4.00
448
449
451
452
453
454
455
456
457
458

459

460

114 4.50 0.00 S

465

115 4.50 0.50

466

117 4.50 1.00

476

118 4.50 2.00

467

119 4.50 2.50

468

120 4.50 3.00

469

121 4.50 3.50

470

122 4.50 4.00

471

472

474

475

477

478

479

480

481

482

483

484

485 S

123 5.00 0.50

486

125 5.00 1.50

487
126 5.0C 2.5C
488
127 5.00 3.50
489
128 5.00 4.C0
490
491
493
494
495
496
497
498
499
500
129 5.50 C.00 S
501
130 5.50 C.5C
502
132 5.50 1.00
503
133 5.50 2.00
504
134 5.5C 3.CC
505
135 5.5C 4.C0
506 S
507
508
510
511
512

```
513
514
515
516
517
518
136 6.00 0.00 S
519
137 6.00 0.50
520
139 6.00 1.00
521
140 6.00 1.50
522
141 6.00 2.50
523
142 6.00 3.50
524
143 6.00 4.00
ELEMENT INCIDENCES
    1   2   1  10 525 148 149
    2   1   9  10 147 151 148
    3  10   9  16 151 164 165
    4  10  16  25 165 179 171
    5  16  24  25 178 181 179
    6  25  24  26 181 193 194
    7  25  26  33 194 202 196
    8  26  32  33 201 204 202
    9  33  32  39 204 216 217
   10  33  39  48 217 301 223
   11  39  47  48 300 303 301
   12  48  47  49 303 315 316
   13  48  49  56 316 324 318
```

14	49	55	56	323	326	324
15	56	55	62	326	338	339
16	56	62	63	339	346	340
17	63	62	71	346	353	354
18	63	71	72	354	355	356
19	63	72	73	356	359	357
20	73	72	74	359	363	364
21	73	74	75	364	366	365
22	75	74	78	366	380	381
23	74	77	78	379	382	380
24	78	77	81	382	387	388
25	77	79	81	386	390	387
26	81	79	88	390	399	400
27	79	80	88	397	398	399
28	80	95	88	404	420	398
29	3	2	10	526	149	150
30	3	10	17	150	166	152
31	10	25	17	171	180	166
32	17	25	27	180	195	182
33	25	33	27	196	203	195
34	27	33	40	203	218	205
35	33	48	40	223	302	218
36	40	48	50	302	317	304
37	48	56	50	318	325	317
38	50	56	64	325	341	327
39	56	63	64	340	347	341
40	64	63	73	347	357	358
41	64	73	75	358	365	360
42	75	78	82	381	389	383
43	78	81	82	388	391	389
44	82	81	88	391	400	401
45	82	88	96	401	421	405
46	88	95	96	420	424	421

47	4	3	18	527	153	154
48	3	17	18	152	172	153
49	18	17	27	172	182	183
50	18	27	41	183	206	197
51	27	40	41	205	224	206
52	41	40	50	224	304	305
53	41	50	65	305	328	319
54	50	64	65	327	348	328
55	65	64	76	348	361	362
56	64	75	76	360	367	361
57	76	75	82	367	383	384
58	65	76	83	362	385	368
59	76	82	83	384	392	385
60	83	82	89	392	402	403
61	82	96	89	405	422	402
62	83	89	97	403	423	406
63	89	96	97	422	425	423
64	97	96	103	425	432	433
65	96	95	103	424	431	432
66	97	103	117	433	451	444
67	95	114	103	443	448	431
68	103	115	117	449	466	451
69	103	114	115	448	465	449
70	117	115	123	466	472	474
71	115	114	123	465	471	472
72	117	123	132	474	493	486
73	114	129	123	485	490	471
74	123	130	132	491	502	493
75	123	129	130	490	501	491
76	132	130	137	502	508	510
77	130	129	137	501	507	508
78	132	137	139	510	520	511
79	129	136	137	506	519	507

80	5	4	18	528	154	155
81	5	18	28	155	184	173
82	18	41	28	197	207	184
83	28	41	51	207	306	225
84	41	65	51	319	329	306
85	51	65	84	329	369	370
86	65	83	84	368	393	369
87	84	83	97	393	406	407
88	84	97	105	407	434	426
89	97	117	105	444	452	434
90	105	117	125	452	475	476
91	117	132	125	486	494	475
92	125	132	140	494	512	503
93	132	139	140	511	521	512
94	6	5	19	529	156	157
95	5	28	19	173	185	156
96	19	28	29	185	198	186
97	6	19	20	157	174	158
98	20	19	29	174	186	187
99	29	28	42	198	208	209
100	29	42	43	209	226	210
101	43	42	52	226	308	309
102	28	51	42	225	307	208
103	42	51	52	307	320	308
104	52	51	66	320	330	331
105	52	66	67	331	349	332
106	67	66	85	349	372	373
107	51	84	66	370	371	330
108	66	84	85	371	394	372
109	85	84	98	394	408	409
110	85	98	99	409	427	410
111	99	98	106	427	436	437
112	84	105	98	426	435	408

113	98	105	106	435	445	436
114	106	105	118	445	453	454
115	106	118	119	454	467	455
116	119	118	126	467	478	479
117	105	125	118	476	477	453
118	118	125	126	477	487	478
119	126	125	133	487	495	496
120	126	133	141	496	514	504
121	125	140	133	503	513	495
122	133	140	141	513	522	514
123	7	6	21	530	159	160
124	7	21	22	160	176	161
125	6	20	21	158	175	159
126	22	21	30	176	189	190
127	21	20	29	175	187	188
128	21	29	30	188	199	189
129	30	29	44	199	211	212
130	30	44	45	212	228	213
131	29	43	44	210	227	211
132	45	44	53	228	311	312
133	44	43	52	227	309	310
134	44	52	53	310	321	311
135	53	52	68	321	333	334
136	53	68	69	334	351	335
137	52	67	68	332	350	333
138	69	68	86	351	375	376
139	68	85	86	374	395	375
140	68	67	85	350	373	374
141	86	85	100	395	411	412
142	86	100	101	412	429	413
143	85	99	100	410	428	411
144	101	100	107	429	439	440
145	100	99	106	428	437	438

146	100	106	107	438	446	439
147	107	106	120	446	456	457
148	107	120	121	457	469	458
149	106	119	120	455	468	456
150	121	120	127	469	481	182
151	120	119	126	468	479	480
152	120	126	127	480	488	481
153	127	126	134	488	497	498
154	127	134	142	498	516	505
155	126	141	134	504	515	497
156	134	141	142	515	523	516
157	8	7	23	531	162	163
158	7	22	23	161	177	162
159	23	22	30	177	190	191
160	23	30	31	191	200	192
161	31	30	46	200	214	215
162	30	45	46	213	229	214
163	46	45	53	229	312	313
164	46	53	54	313	322	314
165	54	53	70	322	336	337
166	53	69	70	345	352	336
167	70	69	86	352	376	377
168	70	86	87	377	396	378
169	87	86	102	396	414	415
170	86	101	102	413	430	414
171	102	101	107	430	440	441
172	102	107	108	441	447	442
173	108	107	122	447	459	460
174	107	121	122	458	470	459
175	122	121	127	470	482	483
176	122	127	128	483	489	484
177	128	127	135	489	499	500
178	127	142	135	505	517	499

```
179 135 142 143 517 524 518
ELEMENT PROPERTIES
1 TO 179 TYPE 'LST' THICKNESS 0.10
CONSTANTS
E 30000. ALL
POISSON 0.3 ALL
JOINT RELEASES
1 TO 8 FORCE Y
525 TO 531 FORCE Y
80 95 114 129 136 404 443 485 506 FORCE X
$ PLATE LENGTH LO=12, WIDTH WO=8,WELD WIDTH W=1/16, WELD LENGTH CENTER
$ TO CENTER L=5.5, END CIRCLE DIAMETER=0.50, SAW CUT WIDTH WS=1/32,
$ SIGMAO=8*10**4
LOADING 'ONE' 'X=0.20'
JOINT LOADS
  1 FORCE Y -0.50
147 FORCE Y -1.0
  9 FORCE Y -1.0
164 FORCE Y -1.0
 16 FORCE Y -0.50
LOADING 'TWO' 'X=0.40'
JOINT LOADS
  1 FORCE Y -0.50
147 FORCE Y -1.00
  9 FORCE Y -1.00
164 FORCE Y -1.00
 16 FORCE Y -1.00
178 FORCE Y -1.00
 24 FORCE Y -1.00
193 FORCE Y -1.00
 26 FORCE Y -0.50
LOADING 'THREE' 'X=0.60'
JOINT LOADS
```

```
     FORCE Y -0.50
     FORCE Y -1.00
   9 FORCE Y -1.00
 164 FORCE Y -1.00
  16 FORCE Y -1.00
 178 FORCE Y -1.00
  24 FORCE Y -1.00
 193 FORCE Y -1.00
  26 FORCE Y -1.00
 201 FORCE Y -1.00
  32 FORCE Y -1.00
 216 FORCE Y -1.00
  39 FORCE Y -0.50
LOADING 'FOUR' 'X=0.80'
JOINT LOADS
   1 FORCE Y -0.50
 147 FORCE Y -1.00
   9 FORCE Y -1.00
 164 FORCE Y -1.00
  16 FORCE Y -1.00
 178 FORCE Y -1.00
  24 FORCE Y -1.00
 193 FORCE Y -1.00
  26 FORCE Y -1.00
 201 FORCE Y -1.00
  32 FORCE Y -1.00
 216 FORCE Y -1.00
  39 FORCE Y -1.00
 300 FORCE Y -1.00
  47 FORCE Y -1.00
 315 FORCE Y -1.00
  49 FORCE Y -0.50
LOADING 'FIVE' 'X=1.00'
```

```
JOINT LOADS
  1 FORCE Y -0.50
147 FORCE Y -1.00
  9 FORCE Y -1.00
164 FORCE Y -1.00
 16 FORCE Y -1.00
178 FORCE Y -1.00
 24 FORCE Y -1.00
193 FORCE Y -1.00
 26 FORCE Y -1.00
201 FORCE Y -1.00
 32 FORCE Y -1.00
216 FORCE Y -1.00
 39 FORCE Y -1.00
300 FORCE Y -1.00
 47 FORCE Y -1.00
315 FORCE Y -1.00
 49 FORCE Y -1.00
323 FORCE Y -1.00
 55 FORCE Y -1.00
338 FORCE Y -1.00
 62 FORCE Y -0.50
      DUMP TIME
      TIME BEGIN
      STIFFNESS ANALYSIS 5
 TIME FOR CONSISTENCY CHECKS FOR  179 MEMBERS=    1.48 SECONDS
 TIME TO GENERATE  179 ELEMENT STIF. MATRICES    14.78 SECONDS
 TIME TO ASSEMBLE THE STIFFNESS MATRIX          101.87 SECONDS
 TIME TO PROCESS  404 JOINTS                     16.21 SECONDS
 TIME TO SOLVE WITH   81 PARTITIONS             884.47 SECONDS
 TIME TO PROCESS   404 JOINT DISPLACEMENTS       89.49 SECONDS
 TIME TO PROCESS  179 ELEMENT STRESSES           62.22 SECONDS

      TIME PRINT
ELAPSED TIME  1172.69 SECONDS

      LIST DISPLACEMENTS STRESSES ALL
```

LOADING - ONE X=0.20

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0048863	
525	0.0	-0.0045995	
2	0.0	-0.0043316	
526	0.0	-0.0040575	
3	0.0	-0.0038001	
527	0.0	-0.0033409	
4	0.0	-0.0030038	
528	0.0	-0.0027707	
5	0.0	-0.0026042	
529	0.0	-0.0023665	
6	0.0	-0.0022300	
530	0.0	-0.0021495	
7	0.0	-0.0020979	
531	0.0	-0.0020772	
8	0.0	-0.0020535	
80	0.0005483	0.0	
404	0.0005434	0.0	
95	0.0005171	0.0	
443	0.0004894	0.0	
114	0.0004925	0.0	
485	0.0005167	0.0	
129	0.0005501	0.0	
506	0.0005681	0.0	
136	0.0005844	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
147	0.0002726	-0.0046557	
148	0.0001204	-0.0044765	
149	0.0000376	-0.0042485	
150	-0.0000139	-0.0039858	
9	0.0004858	-0.0045564	
151	0.0002414	-0.0042878	
10	0.0000770	-0.0040388	
152	-0.0001031	-0.0035494	
153	-0.0001367	-0.0031854	
154	-0.0001162	-0.0029017	
155	-0.0000983	-0.0026922	
156	-0.0000622	-0.0024298	
157	-0.0000457	-0.0022716	
158	-0.0000437	-0.0022157	
159	-0.0000420	-0.0021715	
160	-0.0000470	-0.0021094	
161	-0.0000544	-0.0020865	
162	-0.0000658	-0.0020658	

163	-0.0000328	-0.0020435
164	0.0006658	-0.0040096
165	0.0003231	-0.0038234
166	-0.0000418	-0.0034529
16	0.0007738	-0.0034402
171	0.0001397	-0.0031644
17	-0.0001243	-0.0029192
172	-0.0002123	-0.0027558
18	-0.0002065	-0.0026229
173	-0.0001279	-0.0024322
19	-0.0000977	-0.0022781
174	-0.0000875	-0.0022181
20	-0.0000833	-0.0021694
175	-0.0000826	-0.0021304
21	-0.0000856	-0.0020993
176	-0.0000929	-0.0020743
22	-0.0001065	-0.0020529
177	-0.0001289	-0.0020332
23	-0.0001626	-0.0020132
178	0.0007890	-0.0027548
179	0.0004019	-0.0027411
180	0.0000058	-0.0025742
24	0.0006887	-0.0023151
181	0.0004086	-0.0022752
25	0.0001966	-0.0022297
182	-0.0001208	-0.0020575
183	-0.0001385	-0.0022541
184	-0.0001589	-0.0023183
185	-0.0001383	-0.0022278
186	-0.0001214	-0.0021344
187	-0.0001176	-0.0020965
188	-0.0001178	-0.0020650
189	-0.0001350	-0.0020175
190	-0.0001546	-0.0019991
191	-0.0001869	-0.0019818
192	-0.0002351	-0.0019628
193	0.0005777	-0.0020508
194	0.0003834	-0.0020353
195	0.0000533	-0.0019767
26	0.0004937	-0.0018933
196	0.0002303	-0.0018837
27	0.0000500	-0.0019334
197	-0.0000926	-0.0020810
28	-0.0001418	-0.0020892
198	-0.0001472	-0.0020553
29	-0.0001447	-0.0020040
199	-0.0001552	-0.0019600
30	-0.0001964	-0.0019274
200	-0.0002379	-0.0019132
31	-0.0002990	-0.0018967
201	0.0004390	-0.0018067
202	0.0003562	-0.0017994
203	0.0001687	-0.0018496
32	0.0004149	-0.0017555
204	0.0003593	-0.0017616
33	0.0002990	-0.0017785
205	0.0001380	-0.0018177
206	0.0000391	-0.0018615
207	-0.0000928	-0.0019248
208	-0.0001429	-0.0019327
209	-0.0001606	-0.0019102
210	-0.0001639	-0.0018953
211	-0.0001699	-0.0018803
212	-0.0002013	-0.0018536
213	-0.0002320	-0.0018416
214	-0.0002800	-0.0018303

215	-0.0003505	-0.0018179
216	0.0004246	-0.0017110
217	0.0003737	-0.0017169
218	0.0002374	-0.0017406
39	0.0004422	-0.0016592
223	0.0003318	-0.0016708
40	0.0001985	-0.0016977
224	0.0000890	-0.0017280
41	-0.0000002	-0.0017570
225	-0.0001067	-0.0017819
42	-0.0001541	-0.0017872
226	-0.0001676	-0.0017836
43	-0.0001768	-0.0017776
227	-0.0001868	-0.0017701
44	-0.0002018	-0.0017620
228	-0.0002247	-0.0017538
45	-0.0002593	-0.0017457
229	-0.0003121	-0.0017376
46	-0.0003899	-0.0017290
300	0.0004652	-0.0015994
301	0.0004092	-0.0016053
302	0.0002846	-0.0016205
47	0.0004895	-0.0015340
303	0.0004299	-0.0015403
48	0.0003703	-0.0015459
304	0.0002392	-0.0015621
305	0.0001242	-0.0015830
306	-0.0000421	-0.0016188
307	-0.0001266	-0.0016430
308	-0.0001708	-0.0016545
309	-0.0001844	-0.0016558
310	-0.0001974	-0.0016547
311	-0.0002415	-0.0016480
312	-0.0002778	-0.0016440
313	-0.0003333	-0.0016392
314	-0.0004137	-0.0016339
315	0.0005143	-0.0014633
316	0.0004506	-0.0014693
317	0.0003196	-0.0014811
49	0.0005385	-0.0013873
318	0.0004051	-0.0013980
50	0.0002673	-0.0014096
319	0.0000501	-0.0014413
51	-0.0000792	-0.0014834
320	-0.0001477	-0.0015144
52	-0.0001877	-0.0015340
321	-0.0002243	-0.0015410
53	-0.0002873	-0.0015402
322	-0.0003436	-0.0015388
54	-0.0004241	-0.0015379
323	0.0005610	-0.0013050
324	0.0004888	-0.0013105
325	0.0003464	-0.0013212
55	0.0005810	-0.0012170
326	0.0005057	-0.0012220
56	0.0004344	-0.0012274
327	0.0002842	-0.0012384
328	0.0001606	-0.0012530
329	-0.0000091	-0.0012999
330	-0.0001072	-0.0013563
331	-0.0001662	-0.0014009
332	-0.0001870	-0.0014161
333	-0.0002061	-0.0014267
334	-0.0002552	-0.0014373
335	-0.0002903	-0.0014393
336	-0.0003428	-0.0014414

337	-0.0004187	-0.0014445
338	0.0005946	-0.0011246
339	0.0005199	-0.0011276
340	0.0004487	-0.0011335
341	0.0003664	-0.0011391
62	0.0006012	-0.0010309
346	0.0005311	-0.0010326
63	0.0004616	-0.0010354
347	0.0003734	-0.0010390
64	0.0002924	-0.0010429
348	0.0001691	-0.0010633
65	0.0000758	-0.0010962
370	-0.0000489	-0.0011797
66	-0.0001289	-0.0012541
349	-0.0001582	-0.0012827
67	-0.0001827	-0.0013052
350	-0.0002045	-0.0013219
68	-0.0002269	-0.0013330
351	-0.0002525	-0.0013405
69	-0.0002850	-0.0013461
352	-0.0003318	-0.0013512
70	-0.0004005	-0.0013570
353	0.0005635	-0.0010142
354	0.0004967	-0.0010137
71	0.0005289	-0.0009942
355	0.0005142	-0.0009537
356	0.0004787	-0.0009768
357	0.0004208	-0.0009832
358	0.0003314	-0.0009840
72	0.0005003	-0.0009077
359	0.0004348	-0.0009150
73	0.0003739	-0.0009211
360	0.0002913	-0.0009250
361	0.0002276	-0.0009391
362	0.0001253	-0.0009801
363	0.0005003	-0.0008417
364	0.0004254	-0.0008513
365	0.0003274	-0.0008540
74	0.0004926	-0.0007672
366	0.0003683	-0.0007715
75	0.0002919	-0.0007913
367	0.0002303	-0.0008179
76	0.0001788	-0.0008482
368	0.0000962	-0.0009147
369	0.0000283	-0.0009800
371	-0.0000746	-0.0010913
372	-0.0001470	-0.0011754
373	-0.0001751	-0.0012056
374	-0.0001988	-0.0012285
375	-0.0002452	-0.0012560
376	-0.0002728	-0.0012646
377	-0.0003113	-0.0012719
378	-0.0003673	-0.0012813
379	0.0005055	-0.0006686
380	0.0004181	-0.0006720
381	0.0003261	-0.0007000
77	0.0005056	-0.0005532
382	0.0004260	-0.0005682
78	0.0003672	-0.0005942
383	0.0002970	-0.0006454
384	0.0002404	-0.0006932
385	0.0001494	-0.0007842
386	0.0005176	-0.0004208
387	0.0004723	-0.0004296
388	0.0004147	-0.0004733
389	0.0003368	-0.0005446

79	0.0005175	-0.0002523
397	0.0005273	-0.0001325
390	0.0005005	-0.0003042
81	0.0004624	-0.0003454
391	0.0003829	-0.0004351
82	0.0003137	-0.0005120
392	0.0002109	-0.0006385
83	0.0001292	-0.0007411
393	0.0000595	-0.0008296
84	0.0000029	-0.0009070
394	-0.0000935	-0.0010344
85	-0.0001645	-0.0011220
395	-0.0002140	-0.0011730
86	-0.0002552	-0.0011994
396	-0.0002831	-0.0012086
87	-0.0003233	-0.0012219
398	0.0005334	-0.0001185
399	0.0005104	-0.0001843
400	0.0004716	-0.0002295
401	0.0004027	-0.0003247
402	0.0002828	-0.0004853
403	0.0001893	-0.0006111
88	0.0004785	-0.0001706
405	0.0003618	-0.0003344
89	0.0002584	-0.0004785
406	0.0001718	-0.0006020
407	0.0000994	-0.0007065
408	-0.0000186	-0.0008804
409	-0.0001120	-0.0010082
410	-0.0001500	-0.0010564
411	-0.0001808	-0.0010939
412	-0.0002220	-0.0011411
413	-0.0002351	-0.0011559
414	-0.0002486	-0.0011680
415	-0.0002676	-0.0011831
420	0.0005147	-0.0000661
421	0.0004322	-0.0002101
422	0.0003298	-0.0003541
423	0.0002375	-0.0004861
424	0.0004731	-0.0001199
96	0.0003932	-0.0002520
425	0.0003038	-0.0003797
97	0.0002192	-0.0005019
426	0.0000773	-0.0007150
98	-0.0000380	-0.0008833
427	-0.0000878	-0.0009527
99	-0.0001314	-0.0010116
428	-0.0001676	-0.0010587
100	-0.0001921	-0.0010931
429	-0.0002059	-0.0011188
101	-0.0002117	-0.0011394
430	-0.0002118	-0.0011558
102	-0.0002055	-0.0011688
431	0.0004748	-0.0001014
432	0.0004139	-0.0002113
433	0.0003380	-0.0003270
434	0.0001882	-0.0005484
435	0.0000559	-0.0007478
436	-0.0000584	-0.0009172
437	-0.0001071	-0.0009880
438	-0.0001512	-0.0010475
439	-0.0001884	-0.0011263
440	-0.0001853	-0.0011538
441	-0.0001742	-0.0011758
442	-0.0001454	-0.0011940
103	0.0004286	-0.0001886

444	0.0002981	-0.0003975
105	0.0001622	-0.0006079
445	0.0000367	-0.0008061
106	-0.0000766	-0.0009849
446	-0.0001648	-0.0011232
107	-0.0001577	-0.0012030
447	-0.0001375	-0.0012356
108	-0.0000948	-0.0012542
448	0.0004758	-0.0000864
449	0.0004408	-0.0001767
451	0.0003905	-0.0002708
452	0.0002699	-0.0004726
453	0.0001441	-0.0006811
454	0.0000216	-0.0008884
455	-0.0000384	-0.0009925
456	-0.0001032	-0.0010989
457	-0.0001597	-0.0012565
458	-0.0001055	-0.0013101
459	-0.0001150	-0.0013322
460	-0.0000899	-0.0013311
465	0.0004837	-0.0000824
115	0.0004556	-0.0001682
466	0.0004138	-0.0002581
117	0.0003638	-0.0003527
476	0.0002501	-0.0005492
118	0.0001321	-0.0007617
467	0.0000744	-0.0008771
119	0.0000176	-0.0009996
468	-0.0000439	-0.0011371
120	-0.0001257	-0.0012948
469	-0.0001411	-0.0014199
121	-0.0000521	-0.0014876
470	-0.0001175	-0.0014310
122	-0.0001314	-0.0014010
471	0.0004953	-0.0000797
472	0.0004724	-0.0001609
474	0.0004370	-0.0002459
475	0.0003435	-0.0004266
477	0.0002396	-0.0006251
478	0.0001358	-0.0008526
479	0.0000833	-0.0009840
480	0.0000369	-0.0011347
481	-0.0000329	-0.0016156
482	-0.0000916	-0.0014204
483	-0.0001488	-0.0014094
484	-0.0002075	-0.0013875
123	0.0004904	-0.0001532
486	0.0004209	-0.0003163
125	0.0003315	-0.0004952
487	0.0002391	-0.0006934
126	0.0001541	-0.0009311
488	0.0000869	-0.0011944
127	-0.0000937	-0.0013956
489	-0.0001915	-0.0013398
128	-0.0003010	-0.0012999
490	0.0005268	-0.0000721
491	0.0005092	-0.0001450
493	0.0004818	-0.0002197
494	0.0004077	-0.0003781
495	0.0003237	-0.0005484
496	0.0002463	-0.0007351
497	0.0001728	-0.0009287
498	0.0000288	-0.0010875
499	-0.0002257	-0.0011480
500	-0.0003673	-0.0011393
501	0.0005447	-0.0000670

130	0.0005283	-0.0001350
502	0.0005030	-0.0002045
132	0.0004708	-0.0002763
503	0.0003950	-0.0004263
133	0.0003192	-0.0005828
504	0.0002428	-0.0007379
134	0.0001278	-0.0008601
505	-0.0000886	-0.0009269
135	-0.0003878	-0.0009439
507	0.0005627	-0.0000607
508	0.0005471	-0.0001224
510	0.0005230	-0.0001861
511	0.0004921	-0.0002521
512	0.0004564	-0.0003205
513	0.0003815	-0.0004594
514	0.0003071	-0.0005945
515	0.0002094	-0.0006966
516	0.0000354	-0.0007534
517	-0.0002284	-0.0007746
518	-0.0003832	-0.0007771
519	0.0005796	-0.0000523
137	0.0005649	-0.0001060
520	0.0005414	-0.0001629
139	0.0005116	-0.0002229
521	0.0004768	-0.0002865
140	0.0004387	-0.0003525
522	0.0003661	-0.0004821
141	0.0002783	-0.0005794
523	0.0001379	-0.0006288
142	-0.0000845	-0.0006395
524	-0.0002293	-0.0006299
143	-0.0003800	-0.0006251

LOADING - TWO X=0.40

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/------------------DISPLACEMENT------------------/		
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0071817	
525	0.0	-0.0069030	
2	0.0	-0.0066452	
526	0.0	-0.0063798	
3	0.0	-0.0061216	
527	0.0	-0.0056140	
4	0.0	-0.0052150	
528	0.0	-0.0049129	
5	0.0	-0.0046869	
529	0.0	-0.0043511	
6	0.0	-0.0041440	
530	0.0	-0.0040151	
7	0.0	-0.0039297	
531	0.0	-0.0038946	
8	0.0	-0.0038540	
80	0.0010467	0.0	
404	0.0010371	0.0	
95	0.0009858	0.0	
443	0.0009332	0.0	
114	0.0009418	0.0	
485	0.0009925	0.0	
129	0.0010617	0.0	

505	0.0010991	0.0
136	0.0011335	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
147	0.0002693	-0.0069679	
148	0.0001512	-0.0067942	
149	0.0000853	-0.0065766	
150	0.0000328	-0.0063208	
9	0.0004732	-0.0069277	
151	0.0003075	-0.0066574	
10	0.0001795	-0.0064128	
152	-0.0000363	-0.0059019	
153	-0.0001257	-0.0054572	
154	-0.0001274	-0.0050936	
155	-0.0001182	-0.0048128	
156	-0.0000831	-0.0044470	
157	-0.0000690	-0.0042084	
158	-0.0000684	-0.0041209	
159	-0.0000681	-0.0040504	
160	-0.0000795	-0.0039489	
161	-0.0000929	-0.0039105	
162	-0.0001130	-0.0038753	
163	-0.0001422	-0.0038369	
164	0.0006346	-0.0065326	
165	0.0004410	-0.0063439	
166	0.0000933	-0.0058810	
16	0.0007852	-0.0063064	
171	0.0003239	-0.0057454	
17	-0.0000538	-0.0052635	
172	-0.0002154	-0.0049640	
18	-0.0002402	-0.0047427	
173	-0.0001632	-0.0044621	
19	-0.0001410	-0.0042223	
174	-0.0001336	-0.0041268	
20	-0.0001319	-0.0040473	
175	-0.0001344	-0.0039837	
21	-0.0001424	-0.0039321	
176	-0.0001573	-0.0038899	
22	-0.0001822	-0.0038536	
177	-0.0002214	-0.0038199	
23	-0.0002795	-0.0037855	
178	0.0008819	-0.0058216	
179	0.0005592	-0.0056048	
180	0.0001399	-0.0049865	
24	0.0008797	-0.0055635	
181	0.0005579	-0.0052166	
25	0.0003038	-0.0048720	
182	-0.0001416	-0.0041048	
183	-0.0001324	-0.0043390	
184	-0.0001955	-0.0043359	
185	-0.0001948	-0.0041609	
186	-0.0001891	-0.0039972	
187	-0.0001890	-0.0039314	
188	-0.0001937	-0.0038765	
189	-0.0002295	-0.0037940	
190	-0.0002648	-0.0037622	
191	-0.0003216	-0.0037322	
192	-0.0004051	-0.0036992	
193	0.0008645	-0.0050211	

194	0.0005245	-0.0048016
195	0.0000379	-0.0042823
26	0.0008579	-0.0045716
196	0.0002646	-0.0042754
27	0.0000422	-0.0040912
197	-0.0001087	-0.0040652
28	-0.0002015	-0.0039894
198	-0.0002282	-0.0038850
29	-0.0002370	-0.0037798
199	-0.0002623	-0.0036980
30	-0.0003373	-0.0036394
200	-0.0004103	-0.0036143
31	-0.0005164	-0.0035855
201	0.0008436	-0.0040593
202	0.0005382	-0.0040492
203	0.0001770	-0.0040148
32	0.0008037	-0.0037785
204	0.0005966	-0.0037851
33	0.0004183	-0.0038085
205	0.0001581	-0.0038399
206	0.0000326	-0.0038245
207	-0.0001416	-0.0037694
208	-0.0002287	-0.0037087
209	-0.0002653	-0.0036343
210	-0.0002748	-0.0035986
211	-0.0002874	-0.0035661
212	-0.0003454	-0.0035131
213	-0.0003996	-0.0034909
214	-0.0004839	-0.0034707
215	-0.0006069	-0.0034489
216	0.0008168	-0.0035917
217	0.0006510	-0.0036061
218	0.0003430	-0.0036492
39	0.0008470	-0.0034279
223	0.0005576	-0.0034576
40	0.0002853	-0.0034977
224	0.0001048	-0.0035209
41	-0.0000273	-0.0035232
225	-0.0001862	-0.0034815
42	-0.0002640	-0.0034412
226	-0.0002868	-0.0034188
43	-0.0003032	-0.0033968
227	-0.0003209	-0.0033759
44	-0.0003474	-0.0033567
228	-0.0003874	-0.0033393
45	-0.0004477	-0.0033236
229	-0.0005402	-0.0033087
46	-0.0006767	-0.0032936
300	0.0008891	-0.0032709
301	0.0007493	-0.0032828
302	0.0004666	-0.0033169
47	0.0009342	-0.0031140
303	0.0007960	-0.0031270
48	0.0006615	-0.0031407
304	0.0003844	-0.0031724
305	0.0001731	-0.0031972
306	-0.0000996	-0.0032124
307	-0.0002320	-0.0032037
308	-0.0003017	-0.0031909
309	-0.0003230	-0.0031824
310	-0.0003440	-0.0031729
311	-0.0004179	-0.0031530
312	-0.0004805	-0.0031443
313	-0.0005774	-0.0031352
314	-0.0007192	-0.0031258
315	0.0009827	-0.0029539

316	0.0008411	-0.0029663
317	0.0005576	-0.0029516
49	0.0010295	-0.0027873
318	0.0007431	-0.0028094
50	0.0004579	-0.0028348
319	0.0000509	-0.0028800
51	-0.0001648	-0.0029214
320	-0.0002737	-0.0029482
52	-0.0003348	-0.0029635
321	-0.0003915	-0.0029651
53	-0.0004970	-0.0029596
322	-0.0005951	-0.0029569
54	-0.0007375	-0.0029553
323	0.0010730	-0.0026124
324	0.0009211	-0.0026231
325	0.0006243	-0.0026463
55	0.0011115	-0.0024292
326	0.0009556	-0.0024390
56	0.0008086	-0.0024505
327	0.0005027	-0.0024734
328	0.0002601	-0.0025007
329	-0.0000508	-0.0025776
330	-0.0002140	-0.0026615
331	-0.0003063	-0.0027266
332	-0.0003377	-0.0027480
333	-0.0003661	-0.0027625
334	-0.0004431	-0.0027760
335	-0.0005014	-0.0027787
336	-0.0005921	-0.0027824
337	-0.0007267	-0.0027884
338	0.0011377	-0.0022394
339	0.0009847	-0.0022453
340	0.0008391	-0.0022575
341	0.0006721	-0.0022690
62	0.0011502	-0.0020488
346	0.0010074	-0.0020521
63	0.0008666	-0.0020582
347	0.0006890	-0.0020658
64	0.0005269	-0.0020742
348	0.0002835	-0.0021145
65	0.0001054	-0.0021770
370	-0.0001168	-0.0023288
66	-0.0002487	-0.0024569
349	-0.0002947	-0.0025052
67	-0.0003323	-0.0025427
350	-0.0003650	-0.0025703
68	-0.0003986	-0.0025885
351	-0.0004379	-0.0026008
69	-0.0004904	-0.0026106
352	-0.0005700	-0.0026201
70	-0.0006916	-0.0026314
353	0.0010733	-0.0020148
354	0.0009376	-0.0020141
71	0.0010029	-0.0019747
355	0.0009730	-0.0018933
356	0.0009015	-0.0019398
357	0.0007853	-0.0019530
358	0.0006063	-0.0019553
72	0.0009452	-0.0018015
359	0.0008144	-0.0018163
73	0.0006926	-0.0018289
360	0.0005278	-0.0018370
361	0.0004014	-0.0018650
362	0.0002020	-0.0019455
363	0.0009459	-0.0016697
364	0.0007964	-0.0016892

365	0.0006010	-0.0016949
74	0.0009314	-0.0015214
366	0.0006837	-0.0015303
75	0.0005314	-0.0015698
367	0.0004094	-0.0016226
76	0.0003084	-0.0016824
368	0.0001498	-0.0018129
369	0.0000244	-0.0019390
371	-0.0001563	-0.0021491
372	-0.0002754	-0.0023026
373	-0.0003194	-0.0023571
374	-0.0003550	-0.0023983
375	-0.0004237	-0.0024475
376	-0.0004663	-0.0024636
377	-0.0005300	-0.0024775
378	-0.0006276	-0.0024956
379	0.0009584	-0.0013252
380	0.0007840	-0.0013322
381	0.0006006	-0.0013879
77	0.0009597	-0.0010960
382	0.0008006	-0.0011259
78	0.0006834	-0.0011775
383	0.0005437	-0.0012791
384	0.0004316	-0.0013739
385	0.0002544	-0.0015538
386	0.0009845	-0.0008334
387	0.0008940	-0.0008507
388	0.0007790	-0.0009374
389	0.0006237	-0.0010787
79	0.0009850	-0.0004995
397	0.0010049	-0.0002623
390	0.0009506	-0.0006021
81	0.0008747	-0.0006837
391	0.0007161	-0.0008613
82	0.0005787	-0.0010137
392	0.0003764	-0.0012645
83	0.0002190	-0.0014670
393	0.0000882	-0.0016405
84	-0.0000186	-0.0017909
394	-0.0001829	-0.0020357
85	-0.0002996	-0.0022012
395	-0.0003738	-0.0022966
86	-0.0004314	-0.0023466
396	-0.0004745	-0.0023646
87	-0.0005424	-0.0023904
398	0.0010167	-0.0002343
399	0.0009710	-0.0003645
400	0.0008938	-0.0004538
401	0.0007567	-0.0006423
402	0.0005196	-0.0009604
403	0.0003372	-0.0012097
88	0.0009080	-0.0003371
405	0.0006770	-0.0006614
89	0.0004738	-0.0009470
406	0.0003065	-0.0011914
407	0.0001697	-0.0013975
408	-0.0000456	-0.0017382
409	-0.0002081	-0.0019861
410	-0.0002713	-0.0020792
411	-0.0003202	-0.0021512
412	-0.0003775	-0.0022423
413	-0.0003916	-0.0022711
414	-0.0004066	-0.0022948
415	-0.0004335	-0.0023245
420	0.0009805	-0.0001306
421	0.0008172	-0.0004154

422	0.0006154	-0.0007006
423	0.0004356	-0.0009622
424	0.0009086	-0.0002370
96	0.0007413	-0.0004987
425	0.0005666	-0.0007518
97	0.0004032	-0.0009938
426	0.0001360	-0.0014152
98	-0.0000725	-0.0017461
427	-0.0001597	-0.0018820
99	-0.0002342	-0.0019971
428	-0.0002936	-0.0020891
100	-0.0003299	-0.0021565
429	-0.0003450	-0.0022070
101	-0.0003447	-0.0022477
430	-0.0003340	-0.0022801
102	-0.0003114	-0.0023059
431	0.0009035	-0.0002010
432	0.0007841	-0.0004189
433	0.0006364	-0.0006486
434	0.0003499	-0.0010878
435	0.0001043	-0.0014826
436	-0.0001008	-0.0018170
437	-0.0001856	-0.0019565
438	-0.0002604	-0.0020736
439	-0.0003094	-0.0022297
440	-0.0002915	-0.0022846
441	-0.0002589	-0.0023284
442	-0.0001927	-0.0023646
103	0.0008149	-0.0003750
444	0.0005636	-0.0007905
105	0.0003075	-0.0012088
445	0.0000777	-0.0016019
106	-0.0001243	-0.0019560
446	-0.0002734	-0.0022300
107	-0.0002351	-0.0023896
447	-0.0001853	-0.0024551
108	-0.0000921	-0.0024923
448	0.0009080	-0.0001724
449	0.0008406	-0.0003526
451	0.0007440	-0.0005404
452	0.0005153	-0.0009429
453	0.0002818	-0.0013581
454	0.0000596	-0.0017703
455	-0.0000475	-0.0019769
456	-0.0001632	-0.0021880
457	-0.0002487	-0.0025012
458	-0.0001284	-0.0026092
459	-0.0001391	-0.0026542
460	-0.0000817	-0.0026526
465	0.0009250	-0.0001651
115	0.0008713	-0.0003370
466	0.0007916	-0.0005172
117	0.0006969	-0.0007066
476	0.0004847	-0.0010993
118	0.0002690	-0.0015235
467	0.0001654	-0.0017534
119	0.0000645	-0.0019971
468	-0.0000447	-0.0022701
120	-0.0001930	-0.0025827
469	-0.0002088	-0.0028314
121	-0.0000170	-0.0029686
470	-0.0001422	-0.0028574
122	-0.0001634	-0.0027983
471	0.0009494	-0.0001606
472	0.0009059	-0.0003240
474	0.0008390	-0.0004951

475	0.0006640	-0.0008581
477	0.0004738	-0.0012559
478	0.0002883	-0.0017105
479	0.0001958	-0.0019726
480	0.0001163	-0.0022728
481	0.0000078	-0.0032294
482	-0.0000953	-0.0028431
483	-0.0002032	-0.0028218
484	-0.0003134	-0.0027785
123	0.0009429	-0.0003104
486	0.0008131	-0.0006401
125	0.0006488	-0.0010007
487	0.0004836	-0.0013988
126	0.0003374	-0.0018748
488	0.0002302	-0.0024007
127	-0.0000979	-0.0028019
489	-0.0002875	-0.0026907
128	-0.0004986	-0.0026113
490	0.0010146	-0.0001471
491	0.0009817	-0.0002958
493	0.0009305	-0.0004480
494	0.0007941	-0.0007698
495	0.0006432	-0.0011144
496	0.0005099	-0.0014904
497	0.0003882	-0.0018793
498	0.0001292	-0.0021975
499	-0.0003558	-0.0023165
500	-0.0006294	-0.0022994
501	0.0010515	-0.0001379
130	0.0010211	-0.0002778
502	0.0009741	-0.0004207
132	0.0009148	-0.0005678
503	0.0007776	-0.0008743
133	0.0006451	-0.0011925
504	0.0005156	-0.0015063
134	0.0003121	-0.0017531
505	-0.0000934	-0.0018865
135	-0.0006693	-0.0019201
507	0.0010890	-0.0001265
508	0.0010600	-0.0002550
510	0.0010156	-0.0003874
511	0.0009587	-0.0005241
512	0.0008938	-0.0006654
513	0.0007605	-0.0009510
514	0.0006328	-0.0012275
515	0.0004623	-0.0014359
516	0.0001410	-0.0015511
517	-0.0003618	-0.0015935
518	-0.0006596	-0.0015984
519	0.0011245	-0.0001112
137	0.0010973	-0.0002250
520	0.0010540	-0.0003450
139	0.0009994	-0.0004710
521	0.0009361	-0.0006040
140	0.0008673	-0.0007412
522	0.0007408	-0.0010095
141	0.0005879	-0.0012110
523	0.0003329	-0.0013136
142	-0.0000862	-0.0013355
524	-0.0003635	-0.0013161
143	-0.0006530	-0.0013064

LOADING - THREE X=0.60

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0089545	
525	0.0	-0.0086745	
2	0.0	-0.0084185	
526	0.0	-0.0081601	
3	0.0	-0.0079120	
527	0.0	-0.0074285	
4	0.0	-0.0070549	
528	0.0	-0.0067779	
5	0.0	-0.0065726	
529	0.0	-0.0062596	
6	0.0	-0.0060451	
530	0.0	-0.0058994	
7	0.0	-0.0057949	
531	0.0	-0.0057489	
8	0.0	-0.0056950	
80	0.0016510	0.0	
404	0.0016338	0.0	
95	0.0015504	0.0	
443	0.0014611	0.0	
114	0.0014654	0.0	
485	0.0015343	0.0	
129	0.0016316	0.0	
506	0.0016846	0.0	
136	0.0017331	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
147	0.0002695	-0.0087360	
148	0.0001499	-0.0085631	
149	0.0000881	-0.0083490	
150	0.0000407	-0.0081008	
9	0.0004698	-0.0086862	
151	0.0003052	-0.0084175	
10	0.0001854	-0.0081818	
152	-0.0000156	-0.0076901	
153	-0.0000975	-0.0072725	
154	-0.0000964	-0.0069371	
155	-0.0000900	-0.0066811	
156	-0.0000643	-0.0063558	
157	-0.0000691	-0.0061131	
158	-0.0000744	-0.0060183	
159	-0.0000800	-0.0059391	
160	-0.0001032	-0.0058189	
161	-0.0001233	-0.0057704	
162	-0.0001515	-0.0057243	
163	-0.0001902	-0.0056728	
164	0.0006065	-0.0082852	
165	0.0004316	-0.0080896	
166	0.0001242	-0.0076529	
16	0.0007128	-0.0080744	
171	0.0003506	-0.0075052	
17	-0.0000063	-0.0070401	
172	-0.0001538	-0.0067845	

18	-0.0001754	-0.0065997
173	-0.0001104	-0.0063808
19	-0.0001271	-0.0061301
174	-0.0001357	-0.0060248
20	-0.0001460	-0.0059349
175	-0.0001591	-0.0058595
21	-0.0001781	-0.0057971
176	-0.0002050	-0.0057445
22	-0.0002429	-0.0056977
177	-0.0002977	-0.0056529
23	-0.0003749	-0.0056062
178	0.0007434	-0.0076540
179	0.0005207	-0.0074253
180	0.0002157	-0.0067631
24	0.0006527	-0.0075440
181	0.0004998	-0.0071636
25	0.0003479	-0.0067784
182	-0.0000917	-0.0058665
183	0.0000115	-0.0062658
184	-0.0000981	-0.0062986
185	-0.0001580	-0.0060850
186	-0.0001978	-0.0058823
187	-0.0002138	-0.0057996
188	-0.0002331	-0.0057295
189	-0.0003009	-0.0056222
190	-0.0003546	-0.0055797
191	-0.0004344	-0.0055390
192	-0.0005463	-0.0054937
193	0.0005579	-0.0073010
194	0.0004776	-0.0070705
195	0.0001428	-0.0063797
26	0.0005812	-0.0073775
196	0.0003484	-0.0068006
27	0.0001992	-0.0063817
197	0.0000335	-0.0061423
28	-0.0001429	-0.0059582
198	-0.0002273	-0.0057741
29	-0.0002764	-0.0056169
199	-0.0003365	-0.0055011
30	-0.0004544	-0.0054190
200	-0.0005575	-0.0053839
31	-0.0007010	-0.0053433
201	0.0006866	-0.0072509
202	0.0005539	-0.0070521
203	0.0003126	-0.0066546
32	0.0008375	-0.0072985
204	0.0006696	-0.0070403
33	0.0005120	-0.0068194
205	0.0002657	-0.0064149
206	0.0001528	-0.0061545
207	-0.0000685	-0.0058088
208	-0.0002219	-0.0056096
209	-0.0003046	-0.0054548
210	-0.0003323	-0.0053912
211	-0.0003615	-0.0053372
212	-0.0004612	-0.0052545
213	-0.0005425	-0.0052215
214	-0.0006621	-0.0051919
215	-0.0008307	-0.0051601
216	0.0010674	-0.0069030
217	0.0007937	-0.0067398
218	0.0004161	-0.0064053
39	0.0012773	-0.0064471
223	0.0006732	-0.0062231
40	0.0003567	-0.0060141
224	0.0001590	-0.0058288

41	0.0000109	-0.0056693
225	-0.0001844	-0.0053931
42	-0.0003067	-0.0052417
226	-0.0003478	-0.0051806
43	-0.0003803	-0.0051290
227	-0.0004142	-0.0050861
44	-0.0004597	-0.0050503
228	-0.0005230	-0.0050204
45	-0.0006127	-0.0049948
229	-0.0007448	-0.0049715
46	-0.0009346	-0.0049486
300	0.0014384	-0.0058138
301	0.0010428	-0.0058376
302	0.0005612	-0.0057651
47	0.0015166	-0.0053513
303	0.0011747	-0.0053666
48	0.0008989	-0.0053794
304	0.0004674	-0.0053765
305	0.0002046	-0.0052904
306	-0.0001214	-0.0051159
307	-0.0002835	-0.0049638
308	-0.0003845	-0.0048728
309	-0.0004190	-0.0048382
310	-0.0004549	-0.0048089
311	-0.0005703	-0.0047633
312	-0.0006630	-0.0047467
313	-0.0008028	-0.0047313
314	-0.0010032	-0.0047155
315	0.0015867	-0.0049719
316	0.0012759	-0.0049948
317	0.0007495	-0.0050325
49	0.0016556	-0.0046238
318	0.0010964	-0.0046670
50	0.0006053	-0.0047043
319	0.0000405	-0.0046699
51	-0.0002247	-0.0046077
320	-0.0003621	-0.0045578
52	-0.0004474	-0.0045287
321	-0.0005334	-0.0045050
53	-0.0006914	-0.0044856
322	-0.0008342	-0.0044791
54	-0.0010392	-0.0044737
323	0.0017205	-0.0042890
324	0.0014358	-0.0043063
325	0.0009027	-0.0043514
55	0.0017775	-0.0039551
326	0.0014978	-0.0039715
56	0.0012369	-0.0039932
327	0.0007151	-0.0040310
328	0.0003381	-0.0040610
329	-0.0000984	-0.0041125
330	-0.0003025	-0.0041603
331	-0.0004180	-0.0042014
332	-0.0004610	-0.0042140
333	-0.0005011	-0.0042210
334	-0.0006150	-0.0042241
335	-0.0007026	-0.0042238
336	-0.0008368	-0.0042263
337	-0.0010344	-0.0042321
338	0.0018174	-0.0036199
339	0.0015489	-0.0036297
340	0.0012952	-0.0036507
341	0.0010102	-0.0036705
62	0.0018348	-0.0032903
346	0.0015874	-0.0032961
63	0.0013459	-0.0033066

347	0.0010430	-0.0033201
64	0.0007811	-0.0033347
348	0.0003919	-0.0033932
65	0.0001227	-0.0034733
370	-0.0001834	-0.0036670
66	-0.0003511	-0.0038112
349	-0.0004095	-0.0038636
67	-0.0004594	-0.0039039
350	-0.0005048	-0.0039329
68	-0.0005531	-0.0039514
351	-0.0006114	-0.0039638
69	-0.0006911	-0.0039743
352	-0.0008117	-0.0039854
70	-0.0009947	-0.0039995
353	0.0017010	-0.0032322
354	0.0014671	-0.0032315
71	0.0015789	-0.0031644
355	0.0015264	-0.0030283
356	0.0014062	-0.0031064
357	0.0012121	-0.0031292
358	0.0009163	-0.0031342
72	0.0014793	-0.0028763
359	0.0012634	-0.0029013
73	0.0010625	-0.0029231
360	0.0007924	-0.0029364
361	0.0005878	-0.0029800
362	0.0002737	-0.0030993
363	0.0014811	-0.0026598
364	0.0012363	-0.0026922
365	0.0009164	-0.0027020
74	0.0014590	-0.0024182
366	0.0010554	-0.0024332
75	0.0008065	-0.0024959
367	0.0006087	-0.0025788
76	0.0004474	-0.0026713
368	0.0002029	-0.0028686
369	0.0000202	-0.0030523
371	-0.0002294	-0.0033461
372	-0.0003855	-0.0035457
373	-0.0004441	-0.0036150
374	-0.0004927	-0.0036671
375	-0.0005936	-0.0037290
376	-0.0006599	-0.0037496
377	-0.0007595	-0.0037679
378	-0.0009119	-0.0037918
379	0.0015048	-0.0021010
380	0.0012219	-0.0021123
381	0.0009229	-0.0022012
77	0.0015087	-0.0017334
382	0.0012514	-0.0017807
78	0.0010607	-0.0018623
383	0.0008327	-0.0020229
384	0.0006511	-0.0021716
385	0.0003698	-0.0024505
386	0.0015504	-0.0013154
387	0.0014043	-0.0013419
388	0.0012177	-0.0014783
389	0.0009651	-0.0017011
79	0.0015525	-0.0007868
397	0.0015848	-0.0004130
390	0.0014963	-0.0009477
81	0.0013734	-0.0010752
391	0.0011165	-0.0013542
82	0.0008936	-0.0015935
392	0.0005680	-0.0019855
83	0.0003222	-0.0022976

393	0.0001260	-0.0025598
84	-0.0000295	-0.0027819
394	-0.0002575	-0.0031347
85	-0.0004153	-0.0033646
395	-0.0005197	-0.0034948
86	-0.0006113	-0.0035634
396	-0.0006836	-0.0035883
87	-0.0007966	-0.0036240
398	0.0016017	-0.0003658
399	0.0015283	-0.0005699
400	0.0014044	-0.0007086
401	0.0011831	-0.0010031
402	0.0008010	-0.0014997
403	0.0005112	-0.0018863
88	0.0014269	-0.0005219
405	0.0010555	-0.0010252
89	0.0007307	-0.0014681
406	0.0004682	-0.0018448
407	0.0002595	-0.0021581
408	-0.0000557	-0.0026671
409	-0.0002845	-0.0030268
410	-0.0003715	-0.0031598
411	-0.0004400	-0.0032621
412	-0.0005263	-0.0033917
413	-0.0005537	-0.0034330
414	-0.0005875	-0.0034671
415	-0.0006441	-0.0035093
420	0.0015427	-0.0002000
421	0.0012811	-0.0006381
422	0.0009582	-0.0010781
423	0.0006736	-0.0014810
424	0.0014270	-0.0003607
96	0.0011597	-0.0007615
425	0.0008822	-0.0011492
97	0.0006261	-0.0015194
426	0.0002195	-0.0021568
98	-0.0000840	-0.0026463
427	-0.0002084	-0.0028448
99	-0.0003133	-0.0030117
428	-0.0003970	-0.0031444
100	-0.0004500	-0.0032419
429	-0.0004759	-0.0033154
101	-0.0004836	-0.0033748
430	-0.0004819	-0.0034223
102	-0.0004695	-0.0034599
431	0.0014171	-0.0003016
432	0.0012273	-0.0006306
433	0.0009939	-0.0009788
434	0.0005492	-0.0016419
435	0.0001811	-0.0022312
436	-0.0001166	-0.0027214
437	-0.0002375	-0.0029239
438	-0.0003429	-0.0030932
439	-0.0004189	-0.0033205
440	-0.0004017	-0.0034014
441	-0.0003700	-0.0034663
442	-0.0002963	-0.0035197
103	0.0012740	-0.0005577
444	0.0008805	-0.0011799
105	0.0004887	-0.0018038
445	0.0001480	-0.0023823
106	-0.0001437	-0.0028957
446	-0.0003550	-0.0032901
107	-0.0003123	-0.0035249
447	-0.0002573	-0.0036215
108	-0.0001460	-0.0036774

448	0.0014171	-0.0002537
449	0.0013110	-0.0005198
451	0.0011596	-0.0007978
452	0.0008057	-0.0013945
453	0.0004527	-0.0020059
454	0.0001259	-0.0026044
455	-0.0000280	-0.0029013
456	-0.0001914	-0.0032025
457	-0.0003122	-0.0036511
458	-0.0001463	-0.0038108
459	-0.0001813	-0.0038803
460	-0.0001216	-0.0038814
465	0.0014391	-0.0002413
115	0.0013549	-0.0004933
466	0.0012302	-0.0007590
117	0.0010833	-0.0010367
476	0.0007576	-0.0016130
118	0.0004341	-0.0022303
467	0.0002818	-0.0025616
119	0.0001359	-0.0029104
468	-0.0000189	-0.0032979
120	-0.0002245	-0.0037379
469	-0.0002419	-0.0040904
121	0.0000337	-0.0042963
470	-0.0001738	-0.0041458
122	-0.0002269	-0.0040654
471	0.0014722	-0.0002336
472	0.0014040	-0.0004717
474	0.0012995	-0.0007216
475	0.0010284	-0.0012517
477	0.0007378	-0.0018302
478	0.0004610	-0.0024862
479	0.0003263	-0.0028613
480	0.0002124	-0.0032886
481	0.0000718	-0.0046424
482	-0.0000736	-0.0041052
483	-0.0002516	-0.0040785
484	-0.0004288	-0.0040194
123	0.0014566	-0.0004497
486	0.0012540	-0.0009287
125	0.0009998	-0.0014526
487	0.0007482	-0.0020283
126	0.0005310	-0.0027115
488	0.0003795	-0.0034631
127	-0.0000674	-0.0040349
489	-0.0003655	-0.0038767
128	-0.0006838	-0.0037654
490	0.0015632	-0.0002121
491	0.0015118	-0.0004268
493	0.0014316	-0.0006466
494	0.0012189	-0.0011127
495	0.0009855	-0.0016115
496	0.0007827	-0.0021538
497	0.0006045	-0.0027128
498	0.0002418	-0.0031694
499	-0.0004607	-0.0033325
500	-0.0008625	-0.0033094
501	0.0016155	-0.0001978
130	0.0015679	-0.0003987
502	0.0014942	-0.0006042
132	0.0014014	-0.0008163
503	0.0011875	-0.0012590
133	0.0009829	-0.0017194
504	0.0007893	-0.0021725
134	0.0004982	-0.0025286
505	-0.0000800	-0.0027170

135	-0.0009148	-0.0027640
507	0.0016687	-0.0001800
508	0.0016234	-0.0003632
510	0.0015537	-0.0005525
511	0.0014647	-0.0007487
512	0.0013632	-0.0009522
513	0.0011561	-0.0013651
514	0.0009613	-0.0017667
515	0.0007130	-0.0020694
516	0.0002539	-0.0022354
517	-0.0004696	-0.0022946
518	-0.0008992	-0.0023017
519	0.0017190	-0.0001560
137	0.0016763	-0.0003162
520	0.0016084	-0.0004863
139	0.0015229	-0.0006661
521	0.0014243	-0.0008573
140	0.0013175	-0.0010558
522	0.0011223	-0.0014461
141	0.0008945	-0.0017423
523	0.0005284	-0.0018939
142	-0.0000732	-0.0019243
524	-0.0004722	-0.0018955
143	-0.0008892	-0.0018812

LOADING - FOUR X=0.80

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/------------------	DISPLACEMENT	------------------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0105086	
525	0.0	-0.0102276	
2	0.0	-0.0099729	
526	0.0	-0.0097178	
3	0.0	-0.0094766	
527	0.0	-0.0090152	
4	0.0	-0.0086794	
528	0.0	-0.0084500	
5	0.0	-0.0082929	
529	0.0	-0.0080497	
6	0.0	-0.0078648	
530	0.0	-0.0077249	
7	0.0	-0.0076123	
531	0.0	-0.0075582	
8	0.0	-0.0074940	
80	0.0023490	0.0	
404	0.0023197	0.0	
95	0.0021940	0.0	
443	0.0020517	0.0	
114	0.0020392	0.0	
485	0.0021159	0.0	
129	0.0022310	0.0	
506	0.0022946	0.0	
136	0.0023514	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT /------------------DISPLACEMENT------------------/

	X DISP.	Y DISP.	Z DISP.
147	0.0002722	-0.0102839	
148	0.0001467	-0.0101116	
149	0.0000837	-0.0098989	
150	0.0000371	-0.0096547	
9	0.0004720	-0.0102188	
151	0.0002983	-0.0099509	
10	0.0001764	-0.0097196	
152	-0.0000220	-0.0092404	
153	-0.0000853	-0.0088543	
154	-0.0000654	-0.0085641	
155	-0.0000532	-0.0083578	
156	-0.0000317	-0.0081257	
157	-0.0000564	-0.0079236	
158	-0.0000696	-0.0078378	
159	-0.0000833	-0.0077627	
160	-0.0001213	-0.0076393	
161	-0.0001482	-0.0075849	
162	-0.0001831	-0.0075306	
163	-0.0002285	-0.0074687	
164	0.0005944	-0.0097979	
165	0.0004156	-0.0095973	
166	0.0001156	-0.0091769	
16	0.0006721	-0.0095739	
171	0.0003356	-0.0089943	
17	-0.0000146	-0.0085512	
172	-0.0001183	-0.0083535	
18	-0.0001058	-0.0082387	
173	-0.0000305	-0.0081441	
19	-0.0000854	-0.0079358	
174	-0.0001127	-0.0078405	
20	-0.0001391	-0.0077550	
175	-0.0001670	-0.0076796	
21	-0.0002005	-0.0076147	
176	-0.0002416	-0.0075571	
22	-0.0002930	-0.0075036	
177	-0.0003612	-0.0074501	
23	-0.0004518	-0.0073929	
178	0.0006591	-0.0091586	
179	0.0004647	-0.0089196	
180	0.0002164	-0.0082285	
24	0.0005090	-0.0090881	
181	0.0004121	-0.0086870	
25	0.0003069	-0.0082799	
182	-0.0001098	-0.0072947	
183	0.0001290	-0.0078963	
184	0.0000404	-0.0080883	
185	-0.0000747	-0.0079063	
186	-0.0001696	-0.0077049	
187	-0.0002090	-0.0076181	
188	-0.0002490	-0.0075419	
189	-0.0003571	-0.0074204	
190	-0.0004300	-0.0073699	
191	-0.0005301	-0.0073200	
192	-0.0006627	-0.0072639	
193	0.0003496	-0.0089382	
194	0.0003622	-0.0086965	
195	0.0001491	-0.0079800	
26	0.0003257	-0.0091594	
196	0.0003207	-0.0085824	
27	0.0003243	-0.0082032	
197	0.0002367	-0.0080302	
28	-0.0000137	-0.0078291	
198	-0.0001709	-0.0076148	

29	-0.0002793	-0.0074273
199	-0.0003890	-0.0072869
30	-0.0005554	-0.0071852
200	-0.0006854	-0.0071407
31	-0.0008573	-0.0070890
201	0.0004015	-0.0092306
202	0.0004450	-0.0090329
203	0.0004235	-0.0086658
32	0.0005425	-0.0095317
204	0.0005991	-0.0092746
33	0.0005880	-0.0090578
205	0.0004804	-0.0086343
206	0.0003926	-0.0082871
207	0.0001083	-0.0078027
208	-0.0001382	-0.0074963
209	-0.0002930	-0.0072713
210	-0.0003500	-0.0071824
211	-0.0004054	-0.0071089
212	-0.0005594	-0.0069980
213	-0.0006696	-0.0069542
214	-0.0008216	-0.0069149
215	-0.0010266	-0.0068724
216	0.0007938	-0.0094799
217	0.0008011	-0.0093277
218	0.0006327	-0.0088921
39	0.0011190	-0.0095380
223	0.0008702	-0.0090610
40	0.0005942	-0.0086014
224	0.0003844	-0.0082035
41	0.0002004	-0.0078750
225	-0.0000870	-0.0073520
42	-0.0002844	-0.0070763
226	-0.0003579	-0.0069717
43	-0.0004179	-0.0068869
227	-0.0004779	-0.0068193
44	-0.0005505	-0.0067646
228	-0.0006432	-0.0067206
45	-0.0007648	-0.0066836
229	-0.0009342	-0.0066505
46	-0.0011686	-0.0066182
300	0.0014653	-0.0092372
301	0.0012052	-0.0090846
302	0.0008039	-0.0086285
47	0.0017747	-0.0090283
303	0.0014187	-0.0087804
48	0.0011285	-0.0085428
304	0.0006661	-0.0080849
305	0.0003614	-0.0077200
306	-0.0000417	-0.0071716
307	-0.0002635	-0.0068144
308	-0.0004214	-0.0066141
309	-0.0004796	-0.0065440
310	-0.0005402	-0.0064880
311	-0.0007114	-0.0064083
312	-0.0008378	-0.0063809
313	-0.0010193	-0.0063565
314	-0.0012717	-0.0063317
315	0.0020760	-0.0083634
316	0.0016017	-0.0082099
317	0.0009300	-0.0078622
49	0.0023306	-0.0076522
318	0.0013578	-0.0074423
50	0.0007382	-0.0072124
319	0.0000893	-0.0067685
51	-0.0002250	-0.0064713
320	-0.0004049	-0.0062703

52	-0.0005319	-0.0061621
321	-0.0006637	-0.0060964
53	-0.0008854	-0.0060542
322	-0.0010736	-0.0060405
54	-0.0013371	-0.0060275
323	0.0025136	-0.0067757
324	0.0019205	-0.0068043
325	0.0011093	-0.0067410
55	0.0025988	-0.0060724
326	0.0020659	-0.0060908
56	0.0016206	-0.0061144
327	0.0008692	-0.0061227
328	0.0003886	-0.0060536
329	-0.0001216	-0.0058917
330	-0.0003597	-0.0058068
331	-0.0005041	-0.0057721
332	-0.0005655	-0.0057597
333	-0.0006244	-0.0057476
334	-0.0007893	-0.0057259
335	-0.0009121	-0.0057181
336	-0.0010932	-0.0057153
337	-0.0013536	-0.0057164
338	0.0026457	-0.0054546
339	0.0021672	-0.0054708
340	0.0017460	-0.0055048
341	0.0013099	-0.0055294
62	0.0026611	-0.0048917
346	0.0022376	-0.0049038
63	0.0018481	-0.0049231
347	0.0013893	-0.0049425
64	0.0009939	-0.0049531
348	0.0004565	-0.0049952
65	0.0001178	-0.0050399
370	-0.0002434	-0.0051857
66	-0.0004394	-0.0052853
349	-0.0005108	-0.0053202
67	-0.0005773	-0.0053470
350	-0.0006413	-0.0053656
68	-0.0007113	-0.0053758
351	-0.0007960	-0.0053820
69	-0.0009101	-0.0053880
352	-0.0010780	-0.0053962
70	-0.0013264	-0.0054086
353	0.0024289	-0.0047958
354	0.0020422	-0.0047993
71	0.0022240	-0.0046889
355	0.0021391	-0.0044737
356	0.0019437	-0.0045983
357	0.0016496	-0.0046353
358	0.0012023	-0.0046392
72	0.0020682	-0.0042360
359	0.0017374	-0.0042754
73	0.0014314	-0.0043091
360	0.0010292	-0.0043237
361	0.0007357	-0.0043759
362	0.0003078	-0.0045081
363	0.0020760	-0.0039006
364	0.0017032	-0.0039515
365	0.0012214	-0.0039641
74	0.0020482	-0.0035320
366	0.0014384	-0.0035554
75	0.0010666	-0.0036442
367	0.0007792	-0.0037575
76	0.0005515	-0.0038801
368	0.0002272	-0.0041290
369	-0.0000010	-0.0043464

371	-0.0003035	-0.0046728
372	-0.0004925	-0.0048785
373	-0.0005693	-0.0049483
374	-0.0006353	-0.0050003
375	-0.0007834	-0.0050604
376	-0.0008824	-0.0050806
377	-0.0010276	-0.0050988
378	-0.0012437	-0.0051235
379	0.0021229	-0.0030555
380	0.0016971	-0.0030727
381	0.0012471	-0.0032020
77	0.0021334	-0.0025106
382	0.0017473	-0.0025792
78	0.0014603	-0.0026975
383	0.0011188	-0.0029287
384	0.0008529	-0.0031385
385	0.0004574	-0.0035201
386	0.0021993	-0.0018990
387	0.0019809	-0.0019352
388	0.0017005	-0.0021316
389	0.0013213	-0.0024523
79	0.0022046	-0.0011321
397	0.0022529	-0.0005940
390	0.0021193	-0.0013622
81	0.0019357	-0.0015437
391	0.0015510	-0.0019431
82	0.0012186	-0.0022853
392	0.0007446	-0.0028383
83	0.0004044	-0.0032633
393	0.0001456	-0.0036077
84	-0.0000528	-0.0038878
394	-0.0003371	-0.0043202
85	-0.0005374	-0.0045890
395	-0.0006838	-0.0047370
86	-0.0008307	-0.0048138
396	-0.0009454	-0.0048415
87	-0.0011177	-0.0048817
398	0.0022737	-0.0005194
399	0.0021653	-0.0008107
400	0.0019821	-0.0010063
401	0.0016529	-0.0014247
402	0.0010892	-0.0021280
403	0.0006735	-0.0026667
88	0.0020146	-0.0007313
405	0.0014663	-0.0014393
89	0.0009931	-0.0020598
406	0.0006214	-0.0025800
407	0.0003375	-0.0030012
408	-0.0000756	-0.0036662
409	-0.0003699	-0.0041173
410	-0.0004828	-0.0042805
411	-0.0005757	-0.0044049
412	-0.0007099	-0.0045611
413	-0.0007650	-0.0046104
414	-0.0008347	-0.0046507
415	-0.0009411	-0.0047004
420	0.0021841	-0.0002757
421	0.0017992	-0.0008840
422	0.0013262	-0.0014968
423	0.0009167	-0.0020553
424	0.0020127	-0.0004927
96	0.0016211	-0.0010455
425	0.0012188	-0.0015793
97	0.0008542	-0.0020872
426	0.0002961	-0.0029431
98	-0.0001051	-0.0035779

427	-0.0002633	-0.0038305
99	-0.0004065	-0.0040406
428	-0.0005197	-0.0042063
100	-0.0005985	-0.0043278
429	-0.0006479	-0.0044188
101	-0.0006804	-0.0044924
430	-0.0007086	-0.0045507
102	-0.0007327	-0.0045962
431	0.0019943	-0.0004033
432	0.0017179	-0.0008473
433	0.0013809	-0.0013199
434	0.0007528	-0.0022126
435	0.0002512	-0.0029904
436	-0.0001452	-0.0036205
437	-0.0003061	-0.0038767
438	-0.0004470	-0.0040896
439	-0.0005746	-0.0043752
440	-0.0005775	-0.0044769
441	-0.0005706	-0.0045582
442	-0.0005208	-0.0046244
103	0.0017806	-0.0007353
444	0.0012175	-0.0015640
105	0.0006704	-0.0023887
445	0.0002079	-0.0031387
106	-0.0001823	-0.0037897
446	-0.0004700	-0.0042835
107	-0.0004614	-0.0045802
447	-0.0004279	-0.0047018
108	-0.0003328	-0.0047726
448	0.0019794	-0.0003286
449	0.0018264	-0.0006755
451	0.0016092	-0.0010390
452	0.0011077	-0.0018215
453	0.0006179	-0.0026150
454	0.0001738	-0.0033765
455	-0.0000317	-0.0037490
456	-0.0002467	-0.0041231
457	-0.0004269	-0.0046805
458	-0.0002455	-0.0048831
459	-0.0003268	-0.0049734
460	-0.0002958	-0.0049777
465	0.0020014	-0.0003089
115	0.0018801	-0.0006332
466	0.0017013	-0.0009750
117	0.0014917	-0.0013360
476	0.0010317	-0.0020794
118	0.0005831	-0.0028666
467	0.0003744	-0.0032835
119	0.0001763	-0.0037187
468	-0.0000296	-0.0041968
120	-0.0002939	-0.0047352
469	-0.0003279	-0.0051683
121	-0.0000048	-0.0054322
470	-0.0003075	-0.0052550
122	-0.0004158	-0.0051596
471	0.0020382	-0.0002962
472	0.0019400	-0.0005989
474	0.0017897	-0.0009182
475	0.0014020	-0.0015955
477	0.0009899	-0.0023313
478	0.0006019	-0.0031565
479	0.0004159	-0.0036233
480	0.0002578	-0.0041513
481	0.0000627	-0.0058106
482	-0.0001326	-0.0051640
483	-0.0003954	-0.0051343

484	-0.0006537	-0.0050640
123	0.0020037	-0.0005650
486	0.0017115	-0.0011703
125	0.0013455	-0.0018332
487	0.0009843	-0.0025574
126	0.0006723	-0.0034089
488	0.0004510	-0.0043393
127	-0.0001164	-0.0050443
489	-0.0005300	-0.0048503
128	-0.0009591	-0.0047152
490	0.0021451	-0.0002634
491	0.0020705	-0.0005304
493	0.0019544	-0.0008045
494	0.0016456	-0.0013886
495	0.0013060	-0.0020145
496	0.0010074	-0.0026923
497	0.0007467	-0.0033880
498	0.0002691	-0.0039545
499	-0.0006452	-0.0041494
500	-0.0011715	-0.0041222
501	0.0022078	-0.0002422
130	0.0021386	-0.0004890
502	0.0020316	-0.0007422
132	0.0018964	-0.0010048
503	0.0015833	-0.0015550
133	0.0012803	-0.0021295
504	0.0009964	-0.0026948
134	0.0005995	-0.0031385
505	-0.0001506	-0.0033693
135	-0.0012310	-0.0034262
507	0.0022715	-0.0002163
508	0.0022056	-0.0004370
510	0.0021041	-0.0006665
511	0.0019741	-0.0009059
512	0.0018258	-0.0011559
513	0.0015202	-0.0016673
514	0.0012316	-0.0021685
515	0.0008838	-0.0025470
516	0.0002794	-0.0027535
517	-0.0006566	-0.0028251
518	-0.0012101	-0.0028338
519	0.0023309	-0.0001812
137	0.0022689	-0.0003684
520	0.0021699	-0.0005699
139	0.0020450	-0.0007854
521	0.0019008	-0.0010181
140	0.0017449	-0.0012622
522	0.0014550	-0.0017469
141	0.0011280	-0.0021194
523	0.0006375	-0.0023109
142	-0.0001457	-0.0023473
524	-0.0006601	-0.0023107
143	-0.0011972	-0.0022926

LOADING - FIVE X=1.00

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/--------	DISPLACEMENT	--------/
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0117447	

211

525	0.0	-0.0114627
2	0.0	-0.0112080
526	0.0	-0.0109546
3	0.0	-0.0107172
527	0.0	-0.0102701
4	0.0	-0.0099653
528	0.0	-0.0097784
5	0.0	-0.0096679
529	0.0	-0.0094988
6	0.0	-0.0093574
530	0.0	-0.0092363
7	0.0	-0.0091249
531	0.0	-0.0090665
8	0.0	-0.0089966
80	0.0030945	0.0
404	0.0030434	0.0
95	0.0028597	0.0
443	0.0026438	0.0
114	0.0026014	0.0
485	0.0026763	0.0
129	0.0028008	0.0
506	0.0028708	0.0
136	0.0029318	0.0

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/------------------DISPLACEMENT	------------------/	
	X DISP.	Y DISP.	Z DISP.
147	0.0002737	-0.0115147	
148	0.0001425	-0.0113425	
149	0.0000773	-0.0111301	
150	0.0000297	-0.0108876	
9	0.0004731	-0.0114361	
151	0.0002895	-0.0111686	
10	0.0001630	-0.0109394	
152	-0.0000380	-0.0104664	
153	-0.0000854	-0.0101030	
154	-0.0000465	-0.0098503	
155	-0.0000250	-0.0096892	
156	-0.0000015	-0.0095482	
157	-0.0000393	-0.0094013	
158	-0.0000593	-0.0093325	
159	-0.0000802	-0.0092684	
160	-0.0001308	-0.0091528	
161	-0.0001628	-0.0090968	
162	-0.0002021	-0.0090383	
163	-0.0002504	-0.0089703	
164	0.0005854	-0.0109965	
165	0.0003984	-0.0107922	
166	0.0000941	-0.0103812	
16	0.0006433	-0.0107557	
171	0.0003098	-0.0101676	
17	-0.0000459	-0.0097380	
172	-0.0001092	-0.0095835	
18	-0.0000615	-0.0095295	
173	0.0000380	-0.0095503	
19	-0.0000391	-0.0094037	
174	-0.0000801	-0.0093284	
20	-0.0001205	-0.0092562	
175	-0.0001618	-0.0091884	
21	-0.0002082	-0.0091272	
176	-0.0002613	-0.0090697	

912

22	-0.0003230	-0.0090137
177	-0.0003999	-0.0089554
23	-0.0004966	-0.0088915
178	0.0005997	-0.0103328
179	0.0004146	-0.0100861
180	0.0001884	-0.0093733
24	0.0004074	-0.0102759
181	0.0003361	-0.0098596
25	0.0002525	-0.0094351
182	-0.0001659	-0.0083982
183	0.0001913	-0.0091521
184	0.0001517	-0.0094973
185	0.0000109	-0.0093806
186	-0.0001249	-0.0092085
187	-0.0001857	-0.0091281
188	-0.0002447	-0.0090543
189	-0.0003883	-0.0089302
190	-0.0004764	-0.0088757
191	-0.0005[illegible]98	-0.0088201
192	-0.0007327	-0.0087569
193	0.0002034	-0.0101730
194	0.0002620	-0.0099230
195	0.0001096	-0.0091841
26	0.0001472	-0.0104706
196	0.0002560	-0.0098884
27	0.0003588	-0.0095435
197	0.0003920	-0.0094839
28	0.0001174	-0.0093320
198	-0.0000930	-0.0091360
29	-0.0002562	-0.0089453
199	-0.0004124	-0.0087954
30	-0.0006197	-0.0086825
200	-0.0007676	-0.0086314
31	-0.0009545	-0.0085718
201	0.0002043	-0.0106410
202	0.0003291	-0.0104422
203	0.0004395	-0.0101007
32	0.0003416	-0.0110554
204	0.0004926	-0.0108033
33	0.0005603	-0.0105979
205	0.0005857	-0.0102007
206	0.0005707	-0.0098724
207	0.0002859	-0.0093922
208	-0.0000240	-0.0090638
209	-0.0002466	-0.0088055
210	-0.0003331	-0.0087027
211	-0.0004152	-0.0086177
212	-0.0006196	-0.0084887
213	-0.0007532	-0.0084371
214	-0.0009278	-0.0083903
215	-0.0011537	-0.0083393
216	0.0006006	-0.0111249
217	0.0007131	-0.0109772
218	0.0007140	-0.0105637
39	0.0009375	-0.0113133
223	0.0009077	-0.0108538
40	0.0007716	-0.0104037
224	0.0006069	-0.0099892
41	0.0004167	-0.0096167
225	0.0000600	-0.0089981
42	-0.0002151	-0.0086443
226	-0.0003238	-0.0085096
43	-0.0004136	-0.0084011
227	-0.0005012	-0.0083152
44	-0.0006011	-0.0082461
228	-0.0007208	-0.0081909

45	-0.0008689	-0.0081445
229	-0.0010653	-0.0081030
46	-0.0013271	-0.0080625
300	0.0012969	-0.0111644
301	0.0011810	-0.0110203
302	0.0009687	-0.0105759
47	0.0016185	-0.0111461
303	0.0014431	-0.0108986
48	0.0012727	-0.0106598
304	0.0009157	-0.0101750
305	0.0006095	-0.0097156
306	0.0001231	-0.0089445
307	-0.0001795	-0.0084314
308	-0.0004069	-0.0081393
309	-0.0004929	-0.0080384
310	-0.0005812	-0.0079587
311	-0.0008075	-0.0078480
312	-0.0009623	-0.0078106
313	-0.0011753	-0.0077777
314	-0.0014622	-0.0077442
315	0.0019404	-0.0107597
316	0.0017028	-0.0106150
317	0.0011964	-0.0101584
49	0.0022980	-0.0105011
318	0.0016155	-0.0100342
50	0.0010174	-0.0095453
319	0.0002566	-0.0086987
51	-0.0001450	-0.0081629
320	-0.0003872	-0.0078082
52	-0.0005670	-0.0076180
321	-0.0007502	-0.0075085
53	-0.0010297	-0.0074422
322	-0.0012533	-0.0074207
54	-0.0015583	-0.0073992
323	0.0026367	-0.0099014
324	0.0021530	-0.0097499
325	0.0013818	-0.0093075
55	0.0029041	-0.0094098
326	0.0023588	-0.0091546
56	0.0018985	-0.0089308
327	0.0010818	-0.0085025
328	0.0005371	-0.0081451
329	-0.0000602	-0.0076133
330	-0.0003523	-0.0073413
331	-0.0005390	-0.0072058
332	-0.0006231	-0.0071608
333	-0.0007038	-0.0071243
334	-0.0009205	-0.0070718
335	-0.0010746	-0.0070545
336	-0.0012939	-0.0070446
337	-0.0016017	-0.0070390
338	0.0030845	-0.0085230
339	0.0025163	-0.0083416
340	0.0020383	-0.0081810
341	0.0015352	-0.0080073
62	0.0031764	-0.0077398
346	0.0026231	-0.0074979
63	0.0021725	-0.0073375
347	0.0016121	-0.0071938
64	0.0011402	-0.0070582
348	0.0005259	-0.0068569
65	0.0001384	-0.0067340
370	-0.0002529	-0.0066762
66	-0.0004811	-0.0066740
349	-0.0005684	-0.0066740
67	-0.0006538	-0.0066745

214

350	-0.0007384	-0.0066739
68	-0.0008312	-0.0066697
351	-0.0009418	-0.0066656
69	-0.0010875	-0.0066640
352	-0.0012954	-0.0066666
70	-0.0015964	-0.0066744
353	0.0028607	-0.0074028
354	0.0024037	-0.0072096
71	0.0026212	-0.0070786
355	0.0025766	-0.0066284
356	0.0023227	-0.0068139
357	0.0019360	-0.0067964
358	0.0013776	-0.0066695
72	0.0025450	-0.0061740
359	0.0020739	-0.0062159
73	0.0016639	-0.0062216
360	0.0011616	-0.0061414
361	0.0008130	-0.0061145
362	0.0003276	-0.0061127
363	0.0026061	-0.0056046
364	0.0020546	-0.0056800
365	0.0014015	-0.0056431
74	0.0026016	-0.0050135
366	0.0017056	-0.0050418
75	0.0012158	-0.0051209
367	0.0008584	-0.0052187
76	0.0005901	-0.0053217
368	0.0002286	-0.0055309
369	-0.0000220	-0.0057134
371	-0.0003491	-0.0059682
372	-0.0005659	-0.0061327
373	-0.0006588	-0.0061879
374	-0.0007450	-0.0062290
375	-0.0009402	-0.0062743
376	-0.0010704	-0.0062900
377	-0.0012564	-0.0063047
378	-0.0015272	-0.0063263
379	0.0027405	-0.0042903
380	0.0021046	-0.0043176
381	0.0014607	-0.0044874
77	0.0027718	-0.0034943
382	0.0021984	-0.0035904
78	0.0017786	-0.0037544
383	0.0013042	-0.0040609
384	0.0009642	-0.0043160
385	0.0004895	-0.0047470
386	0.0028777	-0.0026259
387	0.0025569	-0.0026707
388	0.0021424	-0.0029411
389	0.0015956	-0.0033802
79	0.0028901	-0.0015558
397	0.0029607	-0.0008155
390	0.0027624	-0.0018685
81	0.0024932	-0.0021134
391	0.0019342	-0.0026574
82	0.0014650	-0.0031192
392	0.0008476	-0.0038289
83	0.0004409	-0.0043303
393	0.0001409	-0.0047153
84	-0.0000798	-0.0050142
394	-0.0003984	-0.0054627
85	-0.0006348	-0.0057337
395	-0.0008218	-0.0058791
86	-0.0010242	-0.0059532
396	-0.0011794	-0.0059800
87	-0.0014064	-0.0060198

398	0.0028808	-0.0006982
399	0.0028760	-0.0010930
400	0.0025635	-0.0013531
401	0.0020908	-0.0019170
402	0.0013119	-0.0028527
403	0.0007753	-0.0035357
88	0.0026098	-0.0009634
405	0.0018377	-0.0019023
89	0.0011995	-0.0027133
406	0.0007252	-0.0033695
407	0.0003816	-0.0038769
408	-0.0001004	-0.0046492
409	-0.0004422	-0.0051496
410	-0.0005774	-0.0053277
411	-0.0006926	-0.0054622
412	-0.0008749	-0.0056291
413	-0.0009596	-0.0056812
414	-0.0010671	-0.0057233
415	-0.0012241	-0.0057757
420	0.0028484	-0.0003546
421	0.0023066	-0.0011466
422	0.0016546	-0.0019473
423	0.0011114	-0.0026667
424	0.0026053	-0.0006272
96	0.0020610	-0.0013415
425	0.0015177	-0.0020275
97	0.0010403	-0.0026736
426	0.0003489	-0.0037230
98	-0.0001296	-0.0044658
427	-0.0003237	-0.0047557
99	-0.0004904	-0.0049945
428	-0.0006303	-0.0051812
100	-0.0007343	-0.0053174
429	-0.0008090	-0.0054188
101	-0.0008701	-0.0055005
430	-0.0009336	-0.0055646
102	-0.0010014	-0.0056135
431	0.0025744	-0.0005004
432	0.0021946	-0.0010591
433	0.0017403	-0.0016575
434	0.0009245	-0.0027709
435	0.0003032	-0.0037131
436	-0.0001765	-0.0044512
437	-0.0003723	-0.0047467
438	-0.0005451	-0.0049907
439	-0.0007272	-0.0053167
440	-0.0007563	-0.0054325
441	-0.0007826	-0.0055243
442	-0.0007691	-0.0055981
103	0.0022752	-0.0008990
444	0.0015261	-0.0019256
105	0.0008251	-0.0029347
445	0.0002521	-0.0038306
106	-0.0002251	-0.0045888
446	-0.0005841	-0.0051559
107	-0.0006233	-0.0054974
447	-0.0006220	-0.0056364
108	-0.0005592	-0.0057168
448	0.0025339	-0.0003940
449	0.0023276	-0.0008132
451	0.0020378	-0.0012548
452	0.0013813	-0.0022081
453	0.0007582	-0.0031616
454	0.0002054	-0.0040562
455	-0.0000466	-0.0044869
456	-0.0003077	-0.0049157

457	-0.0005512	-0.0055531
458	-0.0003720	-0.0057373
459	-0.0005048	-0.0058931
460	-0.0005161	-0.0058994
465	0.0025509	-0.0003658
115	0.0023384	-0.0007525
466	0.0021502	-0.0011623
117	0.0018739	-0.0015970
476	0.0012761	-0.0024864
118	0.0007056	-0.0034158
467	0.0004430	-0.0039009
119	0.0001961	-0.0044026
468	-0.0000572	-0.0049482
120	-0.0003734	-0.0055575
469	-0.0004300	-0.0060488
121	-0.0000852	-0.0063568
470	-0.0004775	-0.0061622
122	-0.0006478	-0.0060562
471	0.0025867	-0.0003477
472	0.0024555	-0.0007039
474	0.0022555	-0.0010823
475	0.0017444	-0.0018857
477	0.0012084	-0.0027530
478	0.0007098	-0.0037138
479	0.0004739	-0.0042509
480	0.0002720	-0.0048537
481	0.0000159	-0.0067327
482	-0.0002270	-0.0060123
483	-0.0005727	-0.0059805
484	-0.0000113	-0.0059021
123	0.0025266	-0.0006568
486	0.0021380	-0.0013658
125	0.0016540	-0.0021439
487	0.0011798	-0.0029878
126	0.0007700	-0.0039691
488	0.0004727	-0.0050327
127	-0.0002037	-0.0058346
489	-0.0007223	-0.0056151
128	-0.0012521	-0.0054632
490	0.0027008	-0.0003024
491	0.0026012	-0.0006096
493	0.0024462	-0.0009260
494	0.0020346	-0.0016043
495	0.0015824	-0.0023319
496	0.0011820	-0.0031159
497	0.0008332	-0.0039160
498	0.0002468	-0.0045647
499	-0.0008522	-0.0047814
500	-0.0014874	-0.0047515
501	0.0027697	-0.0002740
130	0.0026772	-0.0005539
502	0.0025342	-0.0008423
132	0.0023535	-0.0011431
503	0.0019340	-0.0017762
133	0.0015255	-0.0024401
504	0.0011450	-0.0030922
134	0.0006436	-0.0036033
505	-0.0002592	-0.0038656
135	-0.0015512	-0.0039293
507	0.0028400	-0.0002391
508	0.0027518	-0.0004843
510	0.0026160	-0.0007410
511	0.0024419	-0.0010108
512	0.0022431	-0.0012948
513	0.0018319	-0.0018809
514	0.0014423	-0.0024599

515	0.0009926	-0.0028976
516	0.0002548	-0.0031357
517	-0.0008661	-0.0032165
518	-0.0015258	-0.0032265
519	0.0029044	-0.0001922
137	0.0028215	-0.0003923
520	0.0026888	-0.0006116
139	0.0025215	-0.0008496
521	0.0023286	-0.0011114
140	0.0021200	-0.0013892
522	0.0017281	-0.0019461
141	0.0012974	-0.0023797
523	0.0006880	-0.0026039
142	-0.0002566	-0.0026451
524	-0.0008703	-0.0026025
143	-0.0015106	-0.0025815

ν?

APPENDIX 6

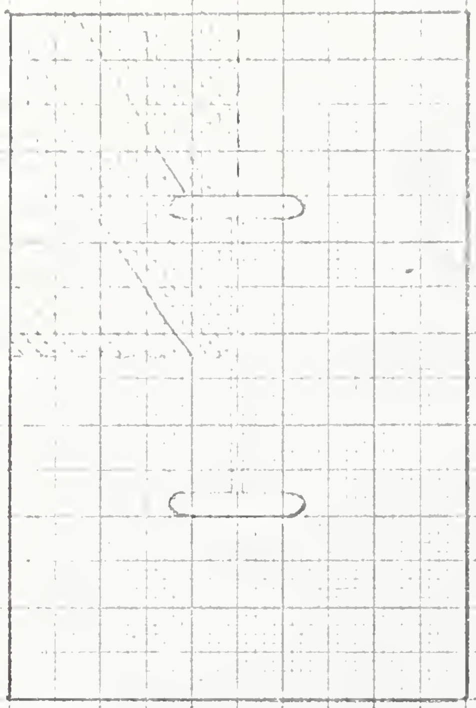
H-slit , 'CSTG' type .

The following presents :

1- Plate division , dark numbers are element names , light numbers are node names , page 220 .

2- Input data , pp 221 - 234 .

3- output data , pp 235 - 247 .




100
90
80
70
60
50
40
30
20
10

```
APPENDIX 6  'H-SLIT'
TYPE PLANE STRESS
UNITS MILLIMETERS
UNITS KILOGRAMS
JOINT COORDINATES
   1    0.0    1.5  S
   2    0.0    5.0  S
   3    0.0   10.0  S
   4    0.0   20.0  S
   5    0.0   30.0  S
   6    0.0   40.0  S
   7    0.0   60.0  S
   8    0.0  100.0  S
   9    5.0    1.5
  10    5.0    5.0
  11    5.0   10.0
  12    5.0   20.0
  13   10.0    1.5
  14   10.0    5.0
  15   15.0    1.5
  16   15.0    5.0
  17   15.0   10.0
  18   15.0   20.0
  19   15.0   40.0
  20   20.0    1.5
  21   20.0    5.0
```

22	25.0	1.5
23	25.0	5.0
24	25.0	10.0
25	25.0	30.0
26	30.0	1.5
27	30.0	5.0
28	35.0	1.5
29	35.0	5.0
30	35.0	10.0
31	35.0	20.0
32	35.0	40.0
33	35.0	60.0
34	35.0	80.0
35	35.0	100.0
36	40.0	1.5
37	40.0	5.0
38	45.0	1.5
39	45.0	5.0
40	45.0	10.0
41	45.0	30.0
42	50.0	1.5
43	50.0	5.0
44	50.0	15.0
45	50.0	25.0
46	52.0	30.0
47	52.0	40.0
48	55.0	1.5
49	55.0	5.0
50	55.0	10.0
51	55.0	20.0
52	55.0	25.0
53	55.0	34.0
54	55.0	50.0

55	57.0	30.0	
56	57.C	37.0	
57	60.0	1.5	
58	60.C	5.0	
59	60.C	1C.C	
60	60.0	15.0	
61	60.C	25.0	
62	60.0	60.0	
63	61.0	33.0	
64	61.C	4C.C	
65	61.5	28.6	
66	65.C	30.0	
67	65.C	35.0	
68	65.0	50.0	
69	68.5	28.6	
70	69.0	33.0	
71	69.0	40.0	
72	70.C	0.0	S
73	70.0	5.0	
74	70.C	10.0	
75	70.C	15.C	
76	70.0	25.0	
77	7C.C	80.0	
78	70.0	100.0	
79	73.0	30.0	
80	73.C	37.C	
81	75.0	0.0	S
82	75.C	5.0	
83	75.C	10.0	
84	75.C	20.0	
85	75.0	25.0	
86	75.0	35.0	
87	75.C	50.0	

88	75.0	60.0	
89	78.0	30.0	
90	78.0	40.0	
91	80.0	5.0	
92	80.0	15.0	
93	80.0	25.0	
94	85.0	0.0	S
95	85.0	10.0	
96	85.0	30.0	
97	90.0	5.0	
98	90.0	20.0	
99	90.0	40.0	
100	90.0	60.0	
101	90.0	100.0	
102	95.0	0.0	S
103	95.0	10.0	
104	95.0	30.0	
105	100.0	5.0	
106	105.0	0.0	S
107	105.0	10.0	
108	105.0	20.0	
109	105.0	40.0	
110	110.0	5.0	
111	115.0	0.0	S
112	115.0	10.0	
113	115.0	30.0	
114	120.0	5.0	
115	125.0	0.0	S
116	125.0	10.0	
117	125.0	20.0	
118	125.0	40.0	
119	125.0	60.0	
120	125.0	80.0	

121	125.0	100.0	
122	130.0	5.0	
123	135.0	0.0	S
124	135.0	10.0	
125	135.0	30.0	
126	140.0	5.0	
127	145.0	0.0	S
128	145.0	10.0	
129	145.0	20.0	
130	145.0	40.0	
131	150.0	0.0	S
132	150.0	5.0	
133	150.0	10.0	
134	150.0	20.0	
135	150.0	30.0	
136	150.0	40.0	
137	150.0	60.0	
138	150.0	100.0	

ELEMENT INCIDENCES

1	2	1	9
2	2	9	10
3	10	9	14
4	14	9	13
5	14	13	15
6	14	15	16
7	16	15	21
8	15	20	21
9	21	20	22
10	21	22	23
11	23	22	27
12	22	26	27
13	27	26	28
14	27	28	29

15	29	28	37
16	28	36	37
17	37	36	38
18	37	38	39
19	39	38	43
20	42	43	38
21	43	42	48
22	43	48	49
23	49	48	58
24	48	57	58
25	49	58	50
26	50	58	59
27	50	59	60
28	50	60	51
29	51	60	61
30	52	51	61
31	52	61	55
32	55	61	65
33	55	65	63
34	63	65	66
35	63	66	67
36	67	66	70
37	70	66	69
38	70	69	79
39	79	69	76
40	79	76	85
41	76	84	85
42	76	75	84
43	75	83	84
44	75	74	83
45	74	73	83
46	73	82	83
47	73	81	82

48	73	72	81
49	3	2	11
50	2	10	11
51	11	10	14
52	11	14	17
53	14	16	17
54	17	16	21
55	17	21	24
56	21	23	24
57	24	23	27
58	24	27	30
59	27	29	30
60	30	29	37
61	30	37	40
62	37	39	40
63	40	39	43
64	40	43	50
65	43	49	50
66	40	50	44
67	44	50	51
68	44	51	45
69	45	51	52
70	45	52	46
71	46	52	55
72	46	55	53
73	53	55	56
74	56	55	63
75	56	63	64
76	64	63	67
77	64	67	71
78	67	70	71
79	71	70	80
80	80	70	86

81	70	79	86
82	86	79	89
83	79	85	89
84	89	85	93
85	93	85	84
86	84	92	93
87	84	83	92
88	83	91	92
89	83	82	91
90	82	81	91
91	81	94	91
92	3	11	4
93	4	11	18
94	18	11	17
95	18	17	24
96	18	24	31
97	24	30	31
98	31	30	40
99	31	40	44
100	31	44	45
101	31	45	41
102	41	45	46
103	41	46	47
104	47	46	53
105	47	53	56
106	47	56	64
107	54	47	64
108	54	64	68
109	68	64	71
110	68	71	87
111	87	71	90
112	71	80	90
113	90	80	86

114	86	89	90
115	90	89	96
116	89	93	96
117	96	93	98
118	93	92	98
119	98	92	95
120	92	91	95
121	95	91	97
122	91	94	97
123	5	4	12
124	12	4	18
125	12	18	25
126	25	18	31
127	25	31	41
128	6	5	12
129	6	12	19
130	19	12	25
131	19	25	32
132	32	25	41
133	32	41	47
134	32	47	54
135	32	54	33
136	33	54	62
137	54	68	62
138	62	68	88
139	68	87	88
140	88	87	100
141	87	99	100
142	87	90	99
143	90	96	99
144	96	104	99
145	96	98	104
146	98	95	103

147	95	97	103
148	97	94	102
149	6	19	7
150	7	19	33
151	19	32	33
152	7	33	34
153	34	33	62
154	34	62	77
155	77	62	88
156	77	88	100
157	100	99	109
158	99	104	109
159	104	98	108
160	98	103	108
161	103	107	108
162	103	97	105
163	103	105	107
164	97	102	105
165	105	102	106
166	105	110	107
167	105	106	110
168	77	100	101
169	100	120	101
170	100	119	120
171	100	109	119
172	109	118	119
173	109	104	113
174	109	113	118
175	118	113	125
176	104	108	113
177	108	117	113
178	113	117	125
179	125	117	129

180	108	107	112
181	108	112	117
182	112	116	117
183	117	116	124
184	117	124	129
185	124	128	129
186	107	110	112
187	110	114	112
188	112	114	116
189	116	114	122
190	116	122	124
191	124	122	126
192	124	126	128
193	128	126	132
194	106	111	110
195	110	111	114
196	114	111	115
197	114	115	122
198	115	123	122
199	122	123	126
200	126	123	127
201	126	127	132
202	127	131	132
203	7	34	8
204	8	34	35
205	35	34	77
206	35	77	78
207	78	77	101
208	101	120	121
209	121	120	138
210	120	137	138
211	120	119	137
212	119	130	137

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213 119 118 130
214 130 136 137
215 118 125 130
216 130 125 135
217 130 135 136
218 125 129 135
219 135 129 134
220 129 133 134
221 129 128 133
222 128 132 133
ELEMENT PROPERTIES
1 TO 222 TYPE 'CSTG' THICKNESS 5.0
CONSTANTS
E 21100. ALL
POISSON .3 ALL
JOINT RELEASES
1 TO 8 FORCE Y
72 81 94 102 106 111 115 123 127 131 FORCE X
LOADING 'ONE' 'R=0.33'
JOINT LOADS
1 FORCE Y -125.0
9 FORCE Y -250.0
13 FORCE Y -250.0
15 FORCE Y -250.0
20 FORCE Y -125.0
LOADING 'TWO' 'R=0.50'
JOINT LOADS
1 FORCE Y -125.0
9 FORCE Y -250.0
13 FORCE Y -250.0
15 FORCE Y -250.0
20 FORCE Y -250.0
22 FORCE Y -250.0
```

1000 500 Kg/
20

```
26 FCRCE Y -125.0
LOADING 'THREE' 'R=0.66'
JOINT LOADS
 1 FORCE Y -125.0
 9 FORCE Y -250.0
13 FORCE Y -250.0
15 FORCE Y -250.0
20 FORCE Y -250.0
22 FORCE Y -250.0
26 FORCE Y -250.0
28 FORCE Y -250.0
36 FORCE Y -125.0
LOADING 'FOUR' 'R=0.83'
JOINT LOADS
 1 FORCE Y -125.0
 9 FORCE Y -250.0
13 FORCE Y -250.0
15 FORCE Y -250.0
20 FORCE Y -250.0
22 FORCE Y -250.0
26 FORCE Y -250.0
28 FORCE Y -250.0
36 FORCE Y -250.0
38 FORCE Y -250.0
42 FORCE Y -125.0
LOADING 'FIVE' 'R=1.0'
JOINT LOADS
 1 FORCE Y -125.0
 9 FORCE Y -250.0
13 FORCE Y -250.0
15 FORCE Y -250.0
20 FORCE Y -250.0
22 FORCE Y -250.0
```

```
26 FORCE Y -250.0
28 FORCE Y -250.0
36 FORCE Y -250.0
38 FORCE Y -250.0
42 FORCE Y -250.0
48 FORCE Y -250.0
57 FORCE Y -125.0
STIFFNESS ANALYSIS
LIST DISPLACEMENTS STRESSES ALL
```

LOADING - ONE R=0.33

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0603966	
2	0.0	-0.0594468	
3	0.0	-0.0576410	
4	0.0	-0.0548952	
5	0.0	-0.0516929	
6	0.0	-0.0495426	
7	0.0	-0.0469618	
8	0.0	-0.0436242	
72	0.0094846	0.0	
81	0.0101828	0.0	
94	0.0111303	0.0	
102	0.0115812	0.0	
106	0.0117069	0.0	
111	0.0116545	0.0	
115	0.0115449	0.0	
123	0.0113149	0.0	
127	0.0109909	0.0	
131	0.0107025	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0023112	-0.0599629	
10	0.0016332	-0.0587361	
11	0.0009699	-0.0572288	
12	-0.0000838	-0.0513172	
13	0.0044323	-0.0582331	
14	0.0031406	-0.0572006	
15	0.0063772	-0.0559198	
16	0.0044664	-0.0546722	
17	0.0026746	-0.0532781	
18	0.0006865	-0.0509567	
19	-0.0005046	-0.0468998	
20	0.0081164	-0.0512993	
21	0.0054060	-0.0508393	
22	0.0089855	-0.0464355	
23	0.0066415	-0.0466015	
24	0.0041497	-0.0465903	
25	0.0003240	-0.0450660	
26	0.0096174	-0.0431111	
27	0.0075242	-0.0431986	
28	0.0100669	-0.0400898	
29	0.0082073	-0.0402264	
30	0.0060420	-0.0403277	
31	0.0031658	-0.0404738	

32	-0.0002184	-0.0401168
33	-0.0027739	-0.0390707
34	-0.0055505	-0.0381519
35	-0.0099883	-0.0367230
36	0.0103339	-0.0375397
37	0.0086880	-0.0375696
38	0.0104803	-0.0351463
39	0.0089846	-0.0351999
40	0.0071875	-0.0352020
41	0.0024572	-0.0354174
42	0.0105016	-0.0330911
43	0.0091414	-0.0330806
44	0.0062001	-0.0328712
45	0.0039963	-0.0328676
46	0.0032561	-0.0317370
47	0.0006737	-0.0315697
48	0.0104591	-0.0311325
49	0.0091840	-0.0311276
50	0.0074949	-0.0310435
51	0.0054567	-0.0306526
52	0.0044915	-0.0303998
53	0.0025357	-0.0300203
54	-0.0015153	-0.0297884
55	0.0039542	-0.0290964
56	0.0017692	-0.0286136
57	0.0104216	-0.0294274
58	0.0091720	-0.0294332
59	0.0075719	-0.0295053
60	0.0063717	-0.0294807
61	0.0048258	-0.0282849
62	-0.0035660	-0.0270376
63	0.0033037	-0.0262223
64	0.0010437	-0.0258942
65	0.0048932	-0.0263705
66	0.0052576	-0.0222105
67	0.0027956	-0.0224143
68	-0.0012269	-0.0235052
69	0.0065509	-0.0169915
70	0.0040841	-0.0179832
71	0.0016543	-0.0195592
73	0.0094573	-0.0022953
74	0.0091941	-0.0046428
75	0.0089395	-0.0071055
76	0.0078533	-0.0131868
77	-0.0087023	-0.0219912
78	-0.0149055	-0.0214369
79	0.0062510	-0.0136131
80	0.0031921	-0.0161182
82	0.0100573	-0.0020960
83	0.0099141	-0.0042192
84	0.0091488	-0.0086029
85	0.0080574	-0.0106319
86	0.0043178	-0.0140657
87	-0.0003827	-0.0171868
88	-0.0030721	-0.0183481
89	0.0065699	-0.0109842
90	0.0027871	-0.0136821
91	0.0106636	-0.0018188
92	0.0100757	-0.0054835
93	0.0083443	-0.0086012
95	0.0108401	-0.0030569
96	0.0071071	-0.0082332
97	0.0113212	-0.0012734
98	0.0097233	-0.0046977
99	0.0040727	-0.0086126
100	-0.0021690	-0.0114540

101	-0.0153683	-0.0129586
103	0.0111636	-0.0020196
104	0.0074970	-0.0054907
105	0.0115549	-0.0008025
107	0.0111854	-0.0011830
108	0.0099645	-0.0023424
109	0.0050361	-0.0045927
110	0.0115795	-0.0004125
112	0.0112805	-0.0005533
113	0.0078895	-0.0016493
114	0.0115030	-0.0001402
116	0.0110585	0.0000482
117	0.0098789	0.0000936
118	0.0051061	0.0000870
119	-0.0010550	-0.0000050
120	-0.0077965	-0.0003537
121	-0.0147516	-0.0005200
122	0.0113350	0.0001914
124	0.0109417	0.0006692
125	0.0077315	0.0018635
126	0.0110626	0.0004883
128	0.0105146	0.0013495
129	0.0093603	0.0025438
130	0.0050552	0.0045468
132	0.0106360	0.0008839
133	0.0103142	0.0017358
134	0.0091191	0.0032421
135	0.0072547	0.0045619
136	0.0049158	0.0057944
137	-0.0011751	0.0069375
138	-0.0144677	0.0075483

LOADING - TWO R=0.50

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-----------------DISPLACEMENT	-----------------/	
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0831649	
2	0.0	-0.0822756	
3	0.0	-0.0805988	
4	0.0	-0.0778629	
5	0.0	-0.0744478	
6	0.0	-0.0719271	
7	0.0	-0.0686974	
8	0.0	-0.0639965	
72	0.0141539	0.0	
81	0.0151969	0.0	
94	0.0166110	0.0	
102	0.0172828	0.0	
106	0.0174701	0.0	
111	0.0173931	0.0	
115	0.0172322	0.0	
123	0.0168931	0.0	
127	0.0164152	0.0	
131	0.0159887	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0026702	-0.0828182	
10	0.0021107	-0.0817021	
11	0.0015201	-0.0803047	
12	0.0001746	-0.0741282	
13	0.0052100	-0.0814128	
14	0.0041355	-0.0804658	
15	0.0076452	-0.0795391	
16	0.0060204	-0.0783687	
17	0.0041795	-0.0769282	
18	0.0018077	-0.0740731	
19	-0.0003683	-0.0685660	
20	0.0098885	-0.0765035	
21	0.0077074	-0.0754935	
22	0.0119113	-0.0728663	
23	0.0091599	-0.0716518	
24	0.0061781	-0.0702744	
25	0.0009854	-0.0663891	
26	0.0136484	-0.0670885	
27	0.0102218	-0.0666077	
28	0.0144762	-0.0612578	
29	0.0115297	-0.0614405	
30	0.0084478	-0.0614481	
31	0.0045327	-0.0609726	
32	-0.0000490	-0.0593643	
33	-0.0038929	-0.0576265	
34	-0.0080128	-0.0562619	
35	-0.0145131	-0.0541588	
36	0.0150015	-0.0570707	
37	0.0123732	-0.0571250	
38	0.0152528	-0.0532005	
39	0.0128910	-0.0532890	
40	0.0101308	-0.0532611	
41	0.0035608	-0.0531154	
42	0.0152683	-0.0499941	
43	0.0131560	-0.0499713	
44	0.0087977	-0.0496157	
45	0.0057388	-0.0493910	
46	0.0047257	-0.0476073	
47	0.0010049	-0.0471621	
48	0.0151870	-0.0469719	
49	0.0132337	-0.0469659	
50	0.0106758	-0.0468278	
51	0.0077827	-0.0461590	
52	0.0064619	-0.0456950	
53	0.0036942	-0.0449719	
54	-0.0021590	-0.0443429	
55	0.0057672	-0.0436593	
56	0.0025790	-0.0428196	
57	0.0151223	-0.0443860	
58	0.0132157	-0.0443960	
59	0.0108043	-0.0445181	
60	0.0090550	-0.0444797	
61	0.0069483	-0.0425497	
62	-0.0051732	-0.0402020	
63	0.0048285	-0.0393007	
64	0.0015138	-0.0387165	
65	0.0071570	-0.0395796	
66	0.0077610	-0.0332665	
67	0.0040906	-0.0335466	
68	-0.0017835	-0.0350496	
69	0.0097395	-0.0254099	
70	0.0060296	-0.0268926	

71	0.0024260	-0.0292294
73	0.0141132	-0.0034291
74	0.0137195	-0.0069366
75	0.0133384	-0.0106168
76	0.0117062	-0.0197095
77	-0.0127542	-0.0327066
78	-0.0218533	-0.0318510
79	0.0032964	-0.0203373
80	0.0047249	-0.0240835
82	0.0150093	-0.0031307
83	0.0147954	-0.0063022
84	0.0136483	-0.0128499
85	0.0120114	-0.0158802
86	0.0064121	-0.0210090
87	-0.0005357	-0.0256489
88	-0.0044726	-0.0273472
89	0.0097819	-0.0164011
90	0.0041435	-0.0204282
91	0.0159146	-0.0027159
92	0.0150350	-0.0081877
93	0.0124424	-0.0128411
95	0.0161770	-0.0045638
96	0.0105965	-0.0122912
97	0.0168952	-0.0019010
98	0.0145079	-0.0070125
99	0.0060881	-0.0128634
100	-0.0031419	-0.0171022
101	-0.0226133	-0.0193237
103	0.0166591	-0.0030150
104	0.0111904	-0.0082022
105	0.0172433	-0.0011987
107	0.0166931	-0.0017695
108	0.0148739	-0.0035042
109	0.0075433	-0.0068785
110	0.0172808	-0.0006185
112	0.0168364	-0.0008331
113	0.0117932	-0.0024858
114	0.0171687	-0.0002139
116	0.0165091	0.0000601
117	0.0147550	0.0001160
118	0.0076665	0.0000827
119	-0.0014653	-0.0000760
120	-0.0114495	-0.0006102
121	-0.0217504	-0.0008524
122	0.0169214	0.0002784
124	0.0163383	0.0009820
125	0.0115687	0.0027318
126	0.0165199	0.0007191
128	0.0157074	0.0019920
129	0.0139921	0.0037531
130	0.0076012	0.0067009
132	0.0158898	0.0013067
133	0.0154116	0.0025658
134	0.0136359	0.0047899
135	0.0108671	0.0067358
136	0.0073963	0.0085512
137	-0.0016327	0.0102251
138	-0.0213374	0.0111138

LOADING - THREE R=0.66

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.1030825	
2	0.0	-0.1022472	
3	0.0	-0.1006755	
4	0.0	-0.0980720	
5	0.0	-0.0947222	
6	0.0	-0.0921420	
7	0.0	-0.0887511	
8	0.0	-0.0829816	
72	0.0188581	0.0	
81	0.0202427	0.0	
94	0.0221170	0.0	
102	0.0230047	0.0	
106	0.0232506	0.0	
111	0.0231492	0.0	
115	0.0229387	0.0	
123	0.0224949	0.0	
127	0.0218697	0.0	
131	0.0213101	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0029493	-0.1027629	
10	0.0024341	-0.1017208	
11	0.0018854	-0.1004184	
12	0.0004487	-0.0944473	
13	0.0057705	-0.1014602	
14	0.0047910	-0.1005676	
15	0.0084707	-0.0997226	
16	0.0070205	-0.0986357	
17	0.0053045	-0.0972638	
18	0.0028570	-0.0944844	
19	0.0000346	-0.0884972	
20	0.0109737	-0.0970650	
21	0.0091034	-0.0960956	
22	0.0132960	-0.0940173	
23	0.0109664	-0.0928414	
24	0.0082077	-0.0913330	
25	0.0020254	-0.0862467	
26	0.0153657	-0.0900692	
27	0.0125951	-0.0890107	
28	0.0172144	-0.0856597	
29	0.0139590	-0.0844334	
30	0.0105342	-0.0830733	
31	0.0061620	-0.0809619	
32	0.0004418	-0.0776742	
33	-0.0047225	-0.0751926	
34	-0.0101439	-0.0734153	
35	-0.0185568	-0.0706841	
36	0.0186957	-0.0790892	
37	0.0148182	-0.0785391	
38	0.0191172	-0.0724617	
39	0.0157569	-0.0725477	
40	0.0121557	-0.0723079	
41	0.0048007	-0.0705772	
42	0.0191742	-0.0678183	
43	0.0162017	-0.0677749	

44	0.0107196	-0.0671114
45	0.0074092	-0.0661054
46	0.0062237	-0.0635254
47	0.0014758	-0.0625141
48	0.0190406	-0.0635874
49	0.0163652	-0.0635846
50	0.0129853	-0.0633602
51	0.0096548	-0.0621725
52	0.0082636	-0.0612895
53	0.0048980	-0.0599093
54	-0.0025834	-0.0585479
55	0.0075594	-0.0583681
56	0.0034469	-0.0569537
57	0.0189343	-0.0601176
58	0.0163465	-0.0601341
59	0.0131772	-0.0603136
60	0.0110305	-0.0602210
61	0.0088481	-0.0571992
62	-0.0065358	-0.0530123
63	0.0063384	-0.0524392
64	0.0020511	-0.0514541
65	0.0093469	-0.0529612
66	0.0102455	-0.0443453
67	0.0053842	-0.0446598
68	-0.0021930	-0.0463983
69	0.0129518	-0.0337880
70	0.0079788	-0.0357570
71	0.0032407	-0.0388199
73	0.0188042	-0.0045525
74	0.0182811	-0.0092099
75	0.0177749	-0.0140982
76	0.0155959	-0.0261866
77	-0.0164591	-0.0431458
78	-0.0282611	-0.0419675
79	0.0123680	-0.0270016
80	0.0062914	-0.0319790
82	0.0199933	-0.0041555
83	0.0197100	-0.0083652
84	0.0181829	-0.0170567
85	0.0159995	-0.0210778
86	0.0085410	-0.0278820
87	-0.0005682	-0.0339908
88	-0.0056678	-0.0361774
89	0.0130251	-0.0217569
90	0.0055556	-0.0270922
91	0.0211943	-0.0036035
92	0.0200256	-0.0108625
93	0.0165737	-0.0170316
95	0.0215406	-0.0060532
96	0.0141235	-0.0162977
97	0.0224922	-0.0025207
98	0.0193221	-0.0092967
99	0.0081731	-0.0170615
100	-0.0039338	-0.0226715
101	-0.0293777	-0.0255754
103	0.0221768	-0.0039972
104	0.0149277	-0.0108808
105	0.0229509	-0.0015898
107	0.0222222	-0.0023504
108	0.0198137	-0.0046551
109	0.0101287	-0.0091495
110	0.0230002	-0.0008236
112	0.0224130	-0.0011145
113	0.0157516	-0.0033288
114	0.0228535	-0.0002901
116	0.0219840	0.0000625

117	0.0196676	0.0001193
118	0.0103220	0.0000401
119	-0.0016858	-0.0002034
120	-0.0147980	-0.0009330
121	-0.0283250	-0.0012441
122	0.0225301	0.0003585
124	0.0217625	0.0012770
125	0.0154711	0.0035471
126	0.0220049	0.0009390
128	0.0209359	0.0026074
129	0.0186725	0.0049057
130	0.0102521	0.0087534
132	0.0211797	0.0017134
133	0.0205486	0.0033641
134	0.0182062	0.0062760
135	0.0145564	0.0088189
136	0.0099854	0.0111883
137	-0.0018889	0.0133561
138	-0.0277954	0.0144970

LOADING - FOUR R=0.83

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/----------DISPLACEMENT	----------/	
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.1206126	
2	0.0	-0.1198094	
3	0.0	-0.1183131	
4	0.0	-0.1158616	
5	0.0	-0.1126758	
6	0.0	-0.1102142	
7	0.0	-0.1070085	
8	-0.0	-0.1004910	
72	0.0237562	0.0	
81	0.0254802	0.0	
94	0.0278095	0.0	
102	0.0289069	0.0	
106	0.0292063	0.0	
111	0.0290778	0.0	
115	0.0288176	0.0	
123	0.0282718	0.0	
127	0.0275043	0.0	
131	0.0268158	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	/----------DISPLACEMENT	----------/	
	X DISP.	Y DISP.	Z DISP.
9	0.0031106	-0.1203024	
10	0.0026188	-0.1193022	
11	0.0021093	-0.1180554	
12	0.0006982	-0.1124172	
13	0.0060840	-0.1190470	
14	0.0051582	-0.1181826	
15	0.0089196	-0.1173815	
16	0.0075646	-0.1163381	

[illegible]	[illegible]	[illegible]
18	0.0036715	-0.1123587
19	0.0006068	-0.1065272
20	0.0115231	-0.1148879
21	0.0098237	-0.1139284
22	0.0139056	-0.1120843
23	0.0118464	-0.1109487
24	0.0094324	-0.1094378
25	0.0032348	-0.1042223
26	0.0160189	-0.1086547
27	0.0136519	-0.1075939
28	0.0179351	-0.1049272
29	0.0152045	-0.1037024
30	0.0121053	-0.1021562
31	0.0080044	-0.0992308
32	0.0013171	-0.0948226
33	-0.0051948	-0.0916559
34	-0.0118782	-0.0895265
35	-0.0220450	-0.0862257
36	0.0194553	-0.1003339
37	0.0164270	-0.0991260
38	0.0205508	-0.0954259
39	0.0171767	-0.0940452
40	0.0137035	-0.0922835
41	0.0064832	-0.0874970
42	0.0212454	-0.0889650
43	0.0173718	-0.0882561
44	0.0120812	-0.0856237
45	0.0092547	-0.0831172
46	0.0080098	-0.0795674
47	0.0022862	-0.0775630
48	0.0210519	-0.0825827
49	0.0177281	-0.0825203
50	0.0139268	-0.0819908
51	0.0112427	-0.0792153
52	0.0101297	-0.0775126
53	0.0063689	-0.0749122
54	-0.0026348	-0.0723736
55	0.0095533	-0.0734378
56	0.0045579	-0.0710635
57	0.0209233	-0.0782443
58	0.0176943	-0.0782643
59	0.0141250	-0.0783524
60	0.0120172	-0.0778806
61	0.0107557	-0.0726472
62	-0.0075371	-0.0654454
63	0.0079992	-0.0657695
64	0.0028206	-0.0641607
65	0.0116560	-0.0667241
66	0.0128801	-0.0555369
67	0.0068258	-0.0558248
68	-0.0023218	-0.0575572
69	0.0163565	-0.0421689
70	0.0100837	-0.0446179
71	0.0042407	-0.0483627
73	0.0236897	-0.0056690
74	0.0230386	-0.0114700
75	0.0224097	-0.0175613
76	0.0196879	-0.0326457
77	-0.0197145	-0.0532947
78	-0.0340217	-0.0517729
79	0.0156262	-0.0336299
80	0.0080361	-0.0398283
82	0.0251697	-0.0051736
83	0.0248186	-0.0104151
84	0.0229160	-0.0212386

	0.0108523	-0.0347023
87	-0.0003544	-0.0422189
88	-0.0065412	-0.0448357
89	0.0164551	-0.0270646
90	0.0071625	-0.0336839
91	0.0266638	-0.0044843
92	0.0252095	-0.0135161
93	0.0208975	-0.0211831
95	0.0270923	-0.0075288
96	0.0178399	-0.0202573
97	0.0282730	-0.0031338
98	0.0243233	-0.0115527
99	0.0104653	-0.0212064
100	-0.0044284	-0.0281572
101	-0.0355549	-0.0317081
103	0.0278757	-0.0049670
104	0.0188573	-0.0135249
105	0.0288362	-0.0019759
107	0.0279291	-0.0029245
108	0.0249364	-0.0057924
109	0.0129291	-0.0113996
110	0.0288936	-0.0010268
112	0.0281641	-0.0013952
113	0.0199086	-0.0041720
114	0.0287111	-0.0003676
116	0.0276352	0.0000582
117	0.0247650	0.0001091
118	0.0132089	-0.0000316
119	-0.0015937	-0.0003760
120	-0.0177277	-0.0013112
121	-0.0343669	-0.0016841
122	0.0283131	0.0004332
124	0.0273645	0.0015579
125	0.0195807	0.0043193
126	0.0276680	0.0011499
128	0.0263487	0.0032004
129	0.0235474	0.0060226
130	0.0131432	0.0107197
132	0.0266543	0.0021067
133	0.0258733	0.0041362
134	0.0229751	0.0077109
135	0.0184630	0.0108254
136	0.0128182	0.0137231
137	-0.0018206	0.0163499
138	-0.0337336	0.0177171

LOADING - FIVE R=1.0

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	/-------------------DISPLACEMENT	-------------------/	
	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.1361623	
2	0.0	-0.1353605	
3	0.0	-0.1339058	
4	0.0	-0.1315984	
5	0.0	-0.1286461	
6	0.0	-0.1264299	
7	0.0	-0.1236860	
8	0.0	-0.1167514	

72	0.0291098	0.0
81	0.0311732	C.0
94	0.0339554	0.0
102	0.0352572	0.0
106	0.0356028	0.0
111	0.0354419	0.0
115	0.0351284	0.0
123	0.0344795	0.0
127	0.0335705	0.0
131	0.0327542	0.0

RESULTANT JCINT DISPLACEMENTS - FREE JOINTS

JCINT	X DISP.	Y DISP.	Z DISP.
9	0.0031175	-0.1358535	
10	0.0026434	-0.1348599	
11	0.0021837	-0.1336191	
12	0.0009234	-0.1283832	
13	0.0060821	-0.1346282	
14	0.0051972	-0.1337583	
15	0.0088908	-0.1330135	
16	0.0076043	-0.1319761	
17	0.0061927	-0.1306701	
18	0.0042371	-0.1281102	
19	0.0013188	-0.1228356	
20	0.0114071	-0.1305931	
21	0.0098359	-0.1296018	
22	0.0136236	-0.1279249	
23	0.0117681	-0.1267756	
24	0.0097680	-0.1252174	
25	0.0044985	-0.1203774	
26	0.0154596	-0.1248085	
27	0.0134323	-0.1236677	
28	0.0169824	-0.1215059	
29	0.0147843	-0.1202646	
30	0.0124918	-0.1186211	
31	0.0096667	-0.1155466	
32	0.0026604	-0.1109441	
33	-0.0052449	-0.1071942	
34	-0.0131795	-0.1047851	
35	-0.0249740	-0.1009749	
36	0.0179192	-0.1178100	
37	0.0157872	-0.1164249	
38	0.0182654	-0.1142333	
39	0.0162009	-0.1127592	
40	0.0143279	-0.1105272	
41	0.0088652	-0.1039273	
42	0.0180062	-0.1111383	
43	0.0161714	-0.1095176	
44	0.0136187	-0.1043918	
45	0.0117672	-0.1003605	
46	0.0104805	-0.0958327	
47	0.0036489	-0.0924369	
48	0.0173771	-0.1082509	
49	0.0156972	-0.1065831	
50	0.0138514	-0.1039626	
51	0.0134567	-0.0977237	
52	0.0126730	-0.0946515	
53	0.0084439	-0.0901305	
54	-0.0021608	-0.0859575	
55	0.0121596	-0.0890946	

56	0.0061785	-0.0852776
57	0.0166007	-0.1060964
58	0.0149949	-0.1044478
59	0.0132727	-0.1021155
60	0.0126459	-0.0993122
61	0.0133335	-0.0892580
62	-0.0080643	-0.0776229
63	0.0101211	-0.0794264
64	0.0040499	-0.0769482
65	0.0145055	-0.0810372
66	0.0159938	-0.0669240
67	0.0086868	-0.0671262
68	-0.0020058	-0.0686204
69	0.0202447	-0.0506123
70	0.0126226	-0.0535321
71	0.0056533	-0.0579228
73	0.0290310	-0.0067860
74	0.0282540	-0.0137320
75	0.0275062	-0.0210296
76	0.0242565	-0.0391339
77	-0.0224526	-0.0632498
78	-0.0391175	-0.0613659
79	0.0193455	-0.0402696
80	0.0102026	-0.0476814
82	0.0308020	-0.0061926
83	0.0303854	-0.0124672
84	0.0281166	-0.0254281
85	0.0248348	-0.0314141
86	0.0135962	-0.0415140
87	0.0002818	-0.0503886
88	-0.0069613	-0.0533895
89	0.0203347	-0.0323613
90	0.0091888	-0.0402440
91	0.0325887	-0.0053650
92	0.0308539	-0.0161696
93	0.0256790	-0.0253263
95	0.0330998	-0.0090019
96	0.0219987	-0.0241940
97	0.0345051	-0.0037450
98	0.0297736	-0.0137948
99	0.0131827	-0.0253168
100	-0.0044806	-0.0335885
101	-0.0411164	-0.0377666
103	0.0340218	-0.0059305
104	0.0232232	-0.0161448
105	0.0351659	-0.0023586
107	0.0340763	-0.0034923
108	0.0304966	-0.0069171
109	0.0161598	-0.0136270
110	0.0352248	-0.0012276
112	0.0343500	-0.0016724
113	0.0244986	-0.0050056
114	0.0350020	-0.0004440
116	0.0337186	0.0000542
117	0.0302940	0.0000990
118	0.0165359	-0.0001077
119	-0.0010342	-0.0005610
120	-0.0201372	-0.0017103
121	-0.0398278	-0.0021399
122	0.0345272	0.0005072
124	0.0333974	0.0018358
125	0.0241254	0.0050799
126	0.0337622	0.0013585
128	0.0321938	0.0037870
129	0.0288557	0.0071224
130	0.0164788	0.0126565

[illegible]	[illegible]	[illegible]
133	0.0316313	0.0049011
134	0.0281788	0.0091306
135	0.0228085	0.0128071
136	0.0160971	0.0162224
137	-0.0012760	0.0192885
138	-0.0391003	0.0208643

APPENDIX 7A

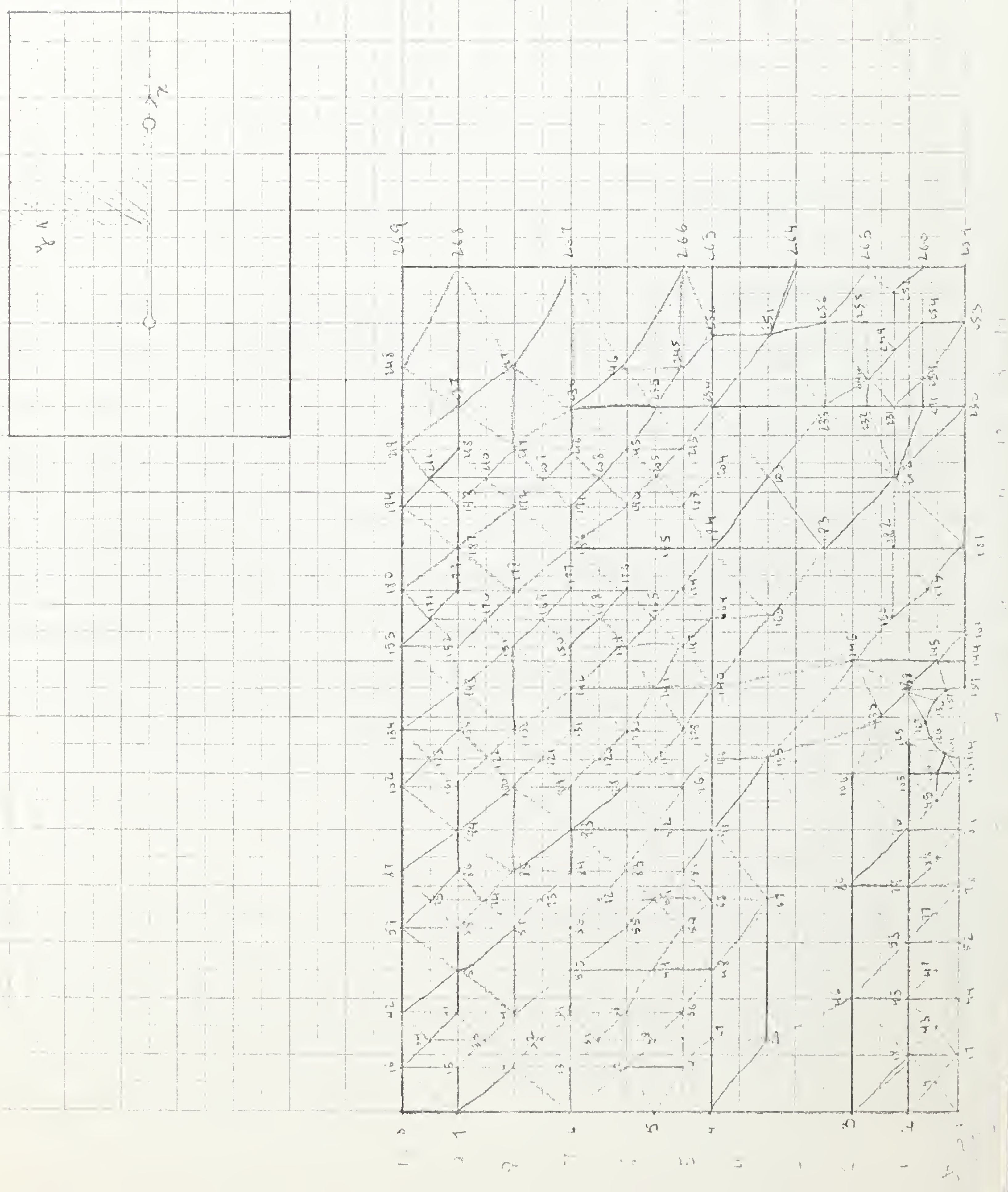
Lehigh specimen,no cut , 'CSTG' type .

The following presents :

1- Plate division , numbers are node names , page 249 .

2- Input data , pp 250 - 267 .

3- Output data , pp 268 - 271 .



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APPENDIX 7A  (LEHIGH SPECIMEN,NO CUT)
TYPE PLANE STRESS
UNITS CENTIMETERS
UNITS KILOGRAMS
JOINT COORDINATES
   1   0.00   0.10 S
   2   0.00   1.00 S
   3   0.00   2.00 S
   4   0.00   4.50 S
   5   0.00   5.50 S
   6   0.00   7.00 S
   7   0.00   9.00 S
   8   0.00  10.00 S
   9   0.50   0.50
  10   0.70   5.00
  12   0.70   6.00
  13   0.70   7.00
  14   0.70   8.00
  15   0.70   9.00
  16   0.70  10.00
  17   1.00   0.10
  18   1.00   1.00
  26   1.25   3.50
```

27	1.25	4.50
28	1.25	5.50
31	1.25	6.50
32	1.25	7.50
33	1.25	8.50
34	1.25	9.50
43	1.50	0.50
36	1.80	5.00
38	1.80	6.00
39	1.80	7.00
40	1.80	8.00
41	1.80	9.00
42	1.80	10.00
44	2.00	0.10
45	2.00	1.00
46	2.00	2.00
47	2.50	0.50
48	2.50	4.50
49	2.50	5.50
50	2.50	7.00
51	2.50	9.00
52	3.00	0.10
53	3.00	1.00
54	3.20	5.00
55	3.20	6.00
56	3.20	7.00
57	3.20	8.00
58	3.20	9.00
59	3.20	10.00
77	3.50	0.50
67	3.75	3.50
68	3.75	4.50
69	3.75	5.50

72	3.75	6.50
73	3.75	7.50
74	3.75	8.50
75	3.75	9.50
78	4.00	0.10
79	4.00	1.00
80	4.00	2.00
81	4.30	5.00
83	4.30	6.00
84	4.30	7.00
85	4.30	8.00
86	4.30	9.00
87	4.30	10.00
88	4.50	0.50
89	5.00	0.10
90	5.00	1.00
91	5.00	4.50
92	5.00	5.50
93	5.00	7.00
94	5.00	9.00
95	5.50	0.50
96	5.70	5.00
98	5.70	6.00
99	5.70	7.00
100	5.70	8.00
101	5.70	9.00
102	5.70	10.00
103	6.00	0.10
104	6.00	0.50
105	6.00	1.00
106	6.00	2.00
115	6.25	3.50
116	6.25	4.50

117	6.25	5.50	
120	6.25	6.50	
121	6.25	7.50	
122	6.25	8.50	
123	6.25	9.50	
114	6.26	0.10	
124	6.354	0.35	
125	6.50	1.00	
276	6.60	0.56	
128	6.80	5.00	
130	6.80	6.00	
131	6.80	7.00	
132	6.80	8.00	
133	6.80	9.00	
134	6.80	10.00	
127	6.875	0.625	
135	7.00	1.50	
136	7.20	0.535	
138	7.40	1.00	
137	7.425	0.30	
139	7.50	0.00	S
140	7.50	4.50	
141	7.50	5.50	
142	7.50	7.00	
143	7.50	9.00	
144	8.00	0.00	S
145	8.00	0.50	
146	8.00	2.00	
147	8.20	5.00	
149	8.20	6.00	
150	8.20	7.00	
151	8.20	8.00	
152	8.20	9.00	

153	8.20	10.00	
161	8.50	0.00	S
162	8.75	1.25	
163	8.75	3.50	
164	8.75	4.50	
165	8.75	5.50	
168	8.75	6.50	
169	8.75	7.50	
170	8.75	8.50	
171	8.75	9.50	
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174	9.30	5.00	
176	9.30	6.00	
177	9.30	7.00	
178	9.30	8.00	
179	9.30	9.00	
180	9.30	10.00	
181	10.00	0.00	S
182	10.00	1.25	
183	10.00	2.50	
184	10.00	4.50	
185	10.00	5.50	
186	10.00	7.00	
187	10.00	9.00	
188	10.70	5.00	
190	10.70	6.00	
191	10.70	7.00	
192	10.70	8.00	
193	10.70	9.00	
194	10.70	10.00	
202	11.25	1.25	
203	11.25	3.50	
204	11.25	4.50	

205	11.25	5.50	
208	11.25	6.50	
209	11.25	7.50	
210	11.25	8.50	
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217	11.80	8.00	
218	11.80	9.00	
219	11.80	10.00	
230	12.50	0.00	S
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232	12.50	1.80	
233	12.50	2.50	
234	12.50	4.50	
235	12.50	5.50	
236	12.50	7.00	
237	12.50	9.00	
239	13.00	0.70	
244	13.00	1.80	
245	13.20	5.00	
246	13.20	6.00	
247	13.20	8.00	
248	13.20	10.00	
249	13.50	1.25	
251	13.80	3.50	
252	13.80	4.50	
253	14.00	0.00	S
254	14.00	0.70	
255	14.00	1.80	
256	14.00	2.50	

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        259 15.00  0.00 S
        260 15.00  0.70
        263 15.00  1.80
        264 15.00  3.00
        265 15.00  4.50
        266 15.00  5.00
        267 15.00  7.00
        268 15.00  9.00
        269 15.00 10.00
   $  BEFORE SAWCUT
   ELEMENT INCIDENCES
              1   1  17   9
              2   2   1   9
              3   2   9  18
              4   9  17  18
              5  17  44  43
              6  18  17  43
              7  18  43  45
              8  43  44  45
              9  44  52  47
             10  45  44  47
             11  45  47  53
             12  47  52  53
             13  52  78  77
             14  53  52  77
             15  53  77  79
             16  77  78  79
             17  78  89  88
             18  79  78  88
             19  79  88  90
             20  88  89  90
             21  95  89 103
```

22	90	89	95
23	90	95	105
24	95	104	105
25	95	103	104
26	103	114	124
27	104	103	124
28	105	104	125
29	104	124	125
30	125	124	276
31	125	276	127
32	125	127	135
33	135	127	138
34	127	136	138
35	136	137	138
36	138	137	145
37	137	139	145
38	139	144	145
39	3	2	18
40	3	18	46
41	18	45	46
42	46	45	53
43	46	53	80
44	53	79	80
45	80	79	90
46	80	90	106
47	90	105	106
48	106	105	125
49	106	125	135
50	135	138	146
51	138	145	146
52	146	145	162
53	145	161	162
54	145	144	161

55	162	161	173
56	173	161	181
57	162	173	182
58	173	181	182
59	182	181	202
60	202	181	230
61	202	230	271
62	271	230	239
63	239	230	253
64	239	253	254
65	254	253	260
66	253	259	260
67	202	271	231
68	231	271	239
69	231	239	249
71	249	254	257
72	254	260	257
73	257	260	263
74	249	239	254
82	244	249	255
83	255	249	257
84	255	257	263
86	232	231	244
87	244	231	249
88	202	231	232
89	202	232	233
90	233	232	244
91	233	244	256
92	244	255	256
93	256	255	263
94	256	263	264
95	4	3	26
96	3	46	26

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98	46	80	67
99	67	80	115
100	80	106	115
101	106	135	115
102	115	135	146
103	115	146	140
104	140	146	163
105	163	146	183
106	146	162	183
107	162	182	183
108	183	182	202
109	183	202	203
110	163	183	184
111	184	183	203
112	203	202	233
113	203	233	234
114	234	233	251
115	233	256	251
116	251	256	264
117	251	264	265
118	4	26	27
119	27	26	48
120	48	26	67
121	48	67	68
122	68	67	91
123	91	67	115
124	91	115	116
125	116	115	140
126	140	163	164
127	164	163	184
128	184	203	204
129	204	203	234

130	234	251	252
131	252	251	265
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133	5	10	12
134	4	27	10
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136	10	27	28
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143	49	54	55
144	48	68	54
145	55	54	69
146	54	68	69
147	69	68	81
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149	83	81	92
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161	128	116	140
162	141	140	147

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164	149	147	165
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166	165	164	174
167	165	174	176
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169	174	184	185
170	185	184	188
171	185	188	190
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173	188	204	205
174	147	140	164
175	174	164	184
176	188	184	204
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178	213	204	234
179	213	234	235
180	205	213	215
181	215	213	235
182	235	234	245
183	245	234	252
184	245	252	266
185	235	245	246
186	246	245	266
187	246	266	267
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190	6	12	13
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192	13	31	32
193	6	13	14
194	14	13	32
195	7	6	14
196	14	32	33

197	7	14	15
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199	15	33	34
200	8	7	16
201	7	15	16
202	16	15	34
203	16	34	42
205	34	41	42
206	34	33	41
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211	31	38	39
213	38	49	50
214	50	49	55
216	39	38	50
217	50	55	56
218	40	39	50
219	40	50	57
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221	41	40	51
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224	42	41	51
225	42	51	59
226	51	58	59
227	59	75	87
228	59	58	75
229	58	74	75
230	58	57	74
231	57	73	74
232	57	56	73

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234	56	55	72
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237	75	74	86
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240	73	84	85
241	73	72	84
242	72	83	84
243	87	94	102
244	87	86	94
245	86	85	94
246	94	85	100
247	94	101	102
248	94	100	101
249	85	93	100
250	85	84	93
251	84	83	93
252	83	92	93
253	93	92	98
254	93	98	99
255	93	99	100
256	102	123	134
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259	101	100	122
260	100	121	122
261	100	99	121
262	99	120	121
263	99	98	120
265	123	133	134
266	123	122	133
267	122	132	133

268	122	121	132
269	121	131	132
270	121	120	131
271	120	130	131
272	134	143	153
273	134	133	143
274	133	132	143
275	143	132	151
276	143	152	153
277	143	151	152
278	132	142	151
279	132	131	142
280	142	150	151
281	131	130	142
282	130	141	142
285	142	141	149
286	142	149	150
287	153	171	180
288	153	152	171
289	152	170	171
290	152	151	170
291	151	169	170
292	151	150	169
293	150	168	169
294	150	149	168
296	171	179	180
297	171	170	179
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300	169	177	178
301	169	168	177
302	168	176	177
303	180	187	194

304	180	179	187
305	179	178	187
306	187	178	192
307	187	192	193
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313	176	185	186
314	186	185	190
315	186	190	191
318	194	211	219
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320	193	210	211
321	193	192	210
322	192	209	210
323	192	191	209
324	191	208	209
325	191	190	208
327	211	218	219
328	211	210	218
329	210	217	218
330	210	209	217
331	209	216	217
332	209	208	216
333	208	215	216
334	219	218	237
335	218	217	237
336	237	217	247
337	217	236	247
338	217	216	236
339	216	215	236

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340 215 235 236
342 236 235 246
343 219 237 248
344 248 237 268
345 248 268 269
346 237 247 268
347 247 267 268
348 247 236 267
349 236 246 267
351  12  28  31
359  31  28  38
363  55  69  72
372  72  69  83
375  98 117 120
382 120 117 130
386 149 165 168
394 168 165 176
398 190 205 208
408 208 205 215
410 252 265 266
ELEMENT PROPERTIES
1 TO 69 71 TO 74 82 TO 84 86 TO 187 189 TO 203 205 TO 211 213 214 -
216 TO 234 236 TO 263 265 TO 282 285 TO 294 296 TO 315 318 TO 325 -
327 TO 340 342 TO 349 351 359 363 372 375 382 386 394 398 408 410 -
TYPE 'CSTG' THICKNESS 1.00
CONSTANTS
E 21100.0 ALL
POISSON 0.30 ALL
JOINT RELEASES
1 TO 8 FORCE Y
139 144 161 181 230 253 259 FORCE X
$ FORCE APPLIED = 10000 KG/CM , SIGMAO = 10000 KG/CM**2
LOADING 'ONE' 'UNIFORM'
JOINT LOADS
1 FORCE Y -50.0
```

```
        17 44 52 78 89 FORCE Y -100.0
        103 FORCE Y -63.0
        114 FORCE Y -13.0
    STIFFNESS ANALYSIS
        LIST DISPLACEMENTS STRESSES ALL
```

LOADING - ONE UNIFORM

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.1238220	
2	0.0	-0.1218426	
3	0.0	-0.1198736	
4	0.0	-0.1114380	
5	0.0	-0.1084211	
6	0.0	-0.1049336	
7	0.0	-0.1011863	
8	0.0	-0.0987520	
139	0.0366592	0.0	
144	0.0349579	0.0	
161	0.0346456	0.0	
181	0.0308965	0.0	
230	0.0277734	0.0	
253	0.0265861	0.0	
259	0.0252243	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0034677	-0.1224273	
10	-0.0008480	-0.1089891	
12	-0.0015844	-0.1064862	
13	-0.0022251	-0.1041831	
14	-0.0030214	-0.1024472	
15	-0.0040784	-0.1003999	
16	-0.0053064	-0.0985278	
17	0.0080562	-0.1222486	
18	0.0054886	-0.1201881	
26	0.0007043	-0.1127369	
27	-0.0008552	-0.1091887	
28	-0.0021827	-0.1061444	
31	-0.0033312	-0.1038064	
32	-0.0045934	-0.1018527	
33	-0.0061834	-0.1000421	
34	-0.0083512	-0.0981743	
43	0.0102577	-0.1192955	
36	-0.0022488	-0.1047578	
38	-0.0038927	-0.1025499	
39	-0.0055753	-0.1004703	
40	-0.0075915	-0.0988882	
41	-0.0101703	-0.0969490	
42	-0.0139074	-0.0951923	
44	0.0158740	-0.1176267	
45	0.0107090	-0.1154786	
46	0.0060690	-0.1132578	

47	0.0167239	-0.1130995
48	-0.0017537	-0.1015480
49	-0.0041317	-0.0993336
50	-0.0076023	-0.0965432
51	-0.0138674	-0.0933583
52	0.0233276	-0.1099376
53	0.0154635	-0.1076428
54	-0.0036363	-0.0949523
55	-0.0066111	-0.0931054
56	-0.0094207	-0.0914378
57	-0.0128547	-0.0902093
58	-0.0172425	-0.0886095
59	-0.0230420	-0.0872028
77	0.0226940	-0.1037290
67	0.0014684	-0.0941615
68	-0.0024632	-0.0913224
69	-0.0059389	-0.0890000
72	-0.0090725	-0.0874845
73	-0.0125584	-0.0862430
74	-0.0169637	-0.0850140
75	-0.0227807	-0.0836722
78	0.0303049	-0.0989394
79	0.0195900	-0.0965939
80	0.0104625	-0.0943864
81	-0.0048498	-0.0837878
83	-0.0082944	-0.0826832
84	-0.0118528	-0.0816101
85	-0.0162517	-0.0807142
86	-0.0217738	-0.0795029
87	-0.0292667	-0.0782810
88	0.0279443	-0.0906609
89	0.0363638	-0.0839827
90	0.0225507	-0.0811545
91	-0.0032904	-0.0755954
92	-0.0070516	-0.0751445
93	-0.0131195	-0.0744101
94	-0.0241772	-0.0729055
95	0.0316955	-0.0732776
96	-0.0051572	-0.0665088
98	-0.0095259	-0.0666960
99	-0.0139786	-0.0665799
100	-0.0194281	-0.0663709
101	-0.0260812	-0.0657161
102	-0.0346643	-0.0650392
103	0.0410111	-0.0643857
104	0.0330721	-0.0630053
105	0.0245932	-0.0619605
106	0.0130530	-0.0612877
115	0.0020205	-0.0578045
116	-0.0024606	-0.0588516
117	-0.0072908	-0.0597450
120	-0.0119737	-0.0602835
121	-0.0172397	-0.0604091
122	-0.0236001	-0.0601908
123	-0.0315188	-0.0596751
114	0.0414107	-0.0577816
124	0.0365982	-0.0543729
125	0.0248541	-0.0494762
276	0.0333514	-0.0467880
128	-0.0045333	-0.0521484
130	-0.0095084	-0.0534436
131	-0.0147789	-0.0540862
132	-0.0209391	-0.0542958
133	-0.0282445	-0.0540793
134	-0.0373023	-0.0536094
127	0.0314676	-0.0371170

135	0.0184765	-0.0371755
136	0.0320516	-0.0252354
138	0.0260633	-0.0230033
137	0.0337740	-0.0112459
140	-0.0010805	-0.0418336
141	-0.0063092	-0.0442750
142	-0.0149349	-0.0462993
143	-0.0290876	-0.0467349
145	0.0329733	-0.0065700
146	0.0174020	-0.0220235
147	-0.0024573	-0.0350088
149	-0.0085697	-0.0371735
150	-0.0147899	-0.0384785
151	-0.0217460	-0.0391730
152	-0.0295381	-0.0393774
153	-0.0387003	-0.0393311
162	0.0270436	-0.0090455
163	0.0094599	-0.0229701
164	0.0020187	-0.0269552
165	-0.0046726	-0.0302156
168	-0.0112231	-0.0321679
169	-0.0181092	-0.0332417
170	-0.0256557	-0.0337557
171	-0.0341280	-0.0338721
173	0.0302797	-0.0034253
174	-0.0002932	-0.0235263
176	-0.0072590	-0.0258891
177	-0.0143116	-0.0273593
178	-0.0217419	-0.0281596
179	-0.0298069	-0.0285229
180	-0.0385926	-0.0285797
182	0.0271078	-0.0038402
183	0.0191801	-0.0083371
184	0.0045573	-0.0158437
185	-0.0027900	-0.0185556
186	-0.0138485	-0.0210555
187	-0.0296817	-0.0221537
188	0.0018452	-0.0121170
190	-0.0057334	-0.0138280
191	-0.0134325	-0.0149734
192	-0.0213082	-0.0156187
193	-0.0294569	-0.0160045
194	-0.0379251	-0.0161597
202	0.0270474	-0.0013527
203	0.0137549	-0.0055587
204	0.0060875	-0.0074434
205	-0.0013668	-0.0090643
208	-0.0091765	-0.0102003
209	-0.0171058	-0.0109012
210	-0.0251722	-0.0113029
211	-0.0334156	-0.0115050
213	0.0028991	-0.0049109
215	-0.0048750	-0.0057979
216	-0.0128881	-0.0064156
217	-0.0209289	-0.0067959
218	-0.0291089	-0.0070057
219	-0.0371919	-0.0071382
271	0.0268472	0.0000773
231	0.0256017	0.0002420
232	0.0236225	0.0003587
233	0.0203275	0.0002186
234	0.0071054	-0.0004622
235	-0.0006211	-0.0008663
236	-0.0126121	-0.0013485
237	-0.0288799	-0.0015650
239	0.0266797	0.0006801

244	0.0235007	0.0014589
245	0.0033280	0.0033710
246	-0.0043960	0.0036597
247	-0.0206248	0.0038092
248	-0.0366467	0.0037632
249	0.0250225	0.0019406
251	0.0140344	0.0058447
252	0.0069591	0.0067710
254	0.0257959	0.0016505
255	0.0227486	0.0040102
256	0.0197020	0.0053705
257	0.0242400	0.0039325
260	0.0249848	0.0027783
263	0.0220303	0.0073302
264	0.0163185	0.0111397
265	0.0066608	0.0144279
266	0.0030020	0.0151937
267	-0.0125602	0.0169812
268	-0.0286050	0.0175406
269	-0.0364414	0.0175417

APPENDIX 7B

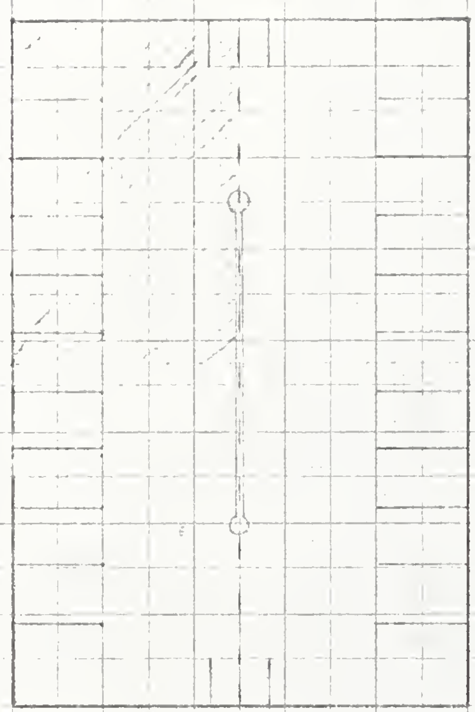
Lehigh specimen with saw-cut , 'CSTG' type .

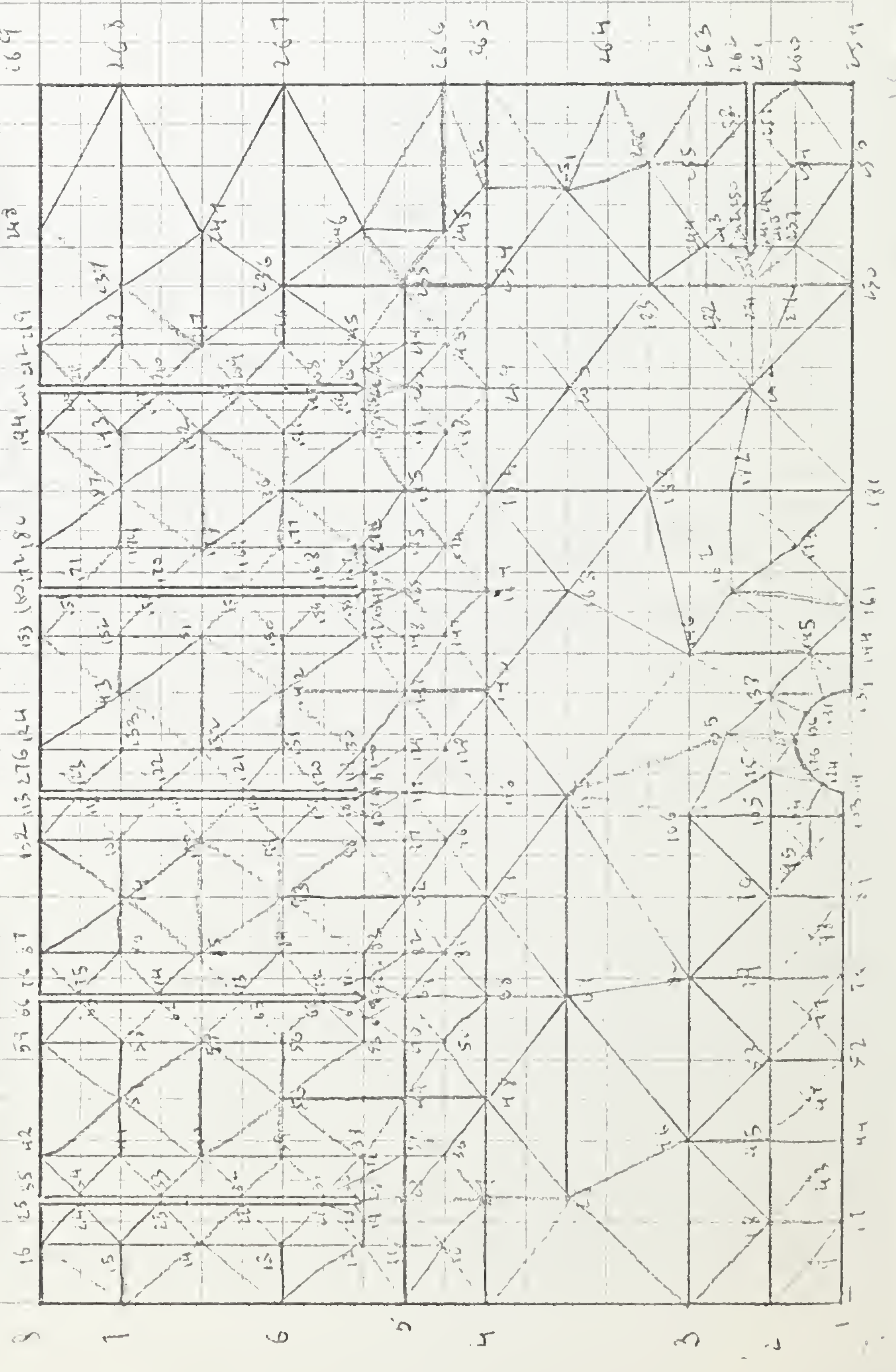
The following presents :

1- Plate division , numbers are node names , page 273 .

2- Input data , pp 274 - 295 .

3- Output data , pp 296 - 300 .





APPENDIX 7B (LEHIGH SPECIMEN,Y=6 CM)
TYPE PLANE STRESS
UNITS CENTIMETERS
UNITS KILOGRAMS
JOINT COORDINATES

1	0.00	0.10	S
2	0.00	1.00	S
3	0.00	3.00	S
4	0.00	4.50	S
5	0.00	5.50	S
6	0.00	7.00	S
7	0.00	9.00	S
8	0.00	10.00	S
9	0.50	0.50	
10	0.70	5.00	
11	0.70	5.50	
12	0.70	6.00	
13	0.70	7.00	
14	0.70	8.00	
15	0.70	9.00	
16	0.70	10.00	
17	1.00	0.10	
18	1.00	1.00	
19	1.00	6.00	
20	1.20	6.10	
21	1.20	6.50	
22	1.20	7.50	
23	1.20	8.50	
24	1.20	9.50	
25	1.20	10.00	
26	1.25	3.50	

19	1.00	6.00
20	1.20	6.10
21	1.20	6.50
22	1.20	7.50
23	1.20	8.50
24	1.20	9.50
25	1.20	10.00
26	1.25	3.50
27	1.25	4.50
28	1.25	5.50
29	1.25	6.00
30	1.30	6.10
31	1.30	6.50
32	1.30	7.50
33	1.30	8.50
34	1.30	9.50
35	1.30	10.00
43	1.50	0.50
272	1.50	6.00
36	1.80	5.00
37	1.80	5.50
38	1.80	6.00
39	1.80	7.00
40	1.80	8.00
41	1.80	9.00
42	1.80	10.00
44	2.00	0.10
45	2.00	1.00
46	2.00	2.00
47	2.50	0.50
48	2.50	4.50
49	2.50	5.50
50	2.50	7.00

51	2.50	9.00
52	3.00	0.10
53	3.00	1.00
54	3.20	5.00
270	3.20	5.50
55	3.20	6.00
56	3.20	7.00
57	3.20	8.00
58	3.20	9.00
59	3.20	10.00
60	3.50	6.00
77	3.50	0.50
61	3.70	6.10
62	3.70	6.50
63	3.70	7.50
64	3.70	8.50
65	3.70	9.50
66	3.70	10.00
67	3.75	3.50
68	3.75	4.50
69	3.75	5.50
70	3.75	6.00
71	3.80	6.10
72	3.80	6.50
73	3.80	7.50
74	3.80	8.50
75	3.80	9.50
76	3.80	10.00
78	4.00	0.10
79	4.00	1.00
80	4.00	2.00
273	4.00	6.00
81	4.30	5.00

82	4.30	5.50
83	4.30	6.00
84	4.30	7.00
85	4.30	8.00
86	4.30	9.00
87	4.30	10.00
88	4.50	0.50
89	5.00	0.10
90	5.00	1.00
91	5.00	4.50
92	5.00	5.50
93	5.00	7.00
94	5.00	9.00
95	5.50	0.50
96	5.70	5.00
97	5.70	5.50
98	5.70	6.00
99	5.70	7.00
100	5.70	8.00
101	5.70	9.00
102	5.70	10.00
103	6.00	0.10
104	6.00	0.50
105	6.00	1.00
106	6.00	2.00
107	6.00	6.00
108	6.20	6.10
109	6.20	6.50
110	6.20	7.50
111	6.20	8.50
112	6.20	9.50
113	6.20	10.00
115	6.25	3.50

116	6.25	4.50	
117	6.25	5.50	
118	6.25	6.00	
114	6.26	0.10	
119	6.30	6.10	
120	6.30	6.50	
121	6.30	7.50	
122	6.30	8.50	
123	6.30	9.50	
277	6.30	10.00	
124	6.354	0.35	
125	6.50	1.00	
126	6.50	6.00	
276	6.60	0.56	
128	6.80	5.00	
129	6.80	5.50	
130	6.80	6.00	
131	6.80	7.00	
132	6.80	8.00	
133	6.80	9.00	
134	6.80	10.00	
127	6.875	0.625	
135	7.00	1.50	
136	7.20	0.535	
138	7.40	1.00	
137	7.425	0.30	
139	7.50	0.00	S
140	7.50	4.50	
141	7.50	5.50	
142	7.50	7.00	
143	7.50	9.00	
144	8.00	0.00	S
145	8.00	0.50	

146	8.00	2.00	
147	8.20	5.00	
148	8.20	5.50	
149	8.20	6.00	
150	8.20	7.00	
151	8.20	8.00	
152	8.20	9.00	
153	8.20	10.00	
161	8.50	0.00	S
154	8.50	6.00	
155	8.70	6.10	
156	8.70	6.50	
157	8.70	7.50	
158	8.70	8.50	
159	8.70	9.50	
160	8.70	10.00	
162	8.75	1.25	
163	8.75	3.50	
164	8.75	4.50	
165	8.75	5.50	
166	8.75	6.00	
167	8.80	6.10	
168	8.80	6.50	
169	8.80	7.50	
170	8.80	8.50	
171	8.80	9.50	
172	8.80	10.00	
274	9.00	6.00	
173	9.30	0.70	
174	9.30	5.00	
175	9.30	5.50	
176	9.30	6.00	
177	9.30	7.00	

178	9.30	8.00	
179	9.30	9.00	
180	9.30	10.00	
181	10.00	0.00	S
182	10.00	1.25	
183	10.00	2.50	
184	10.00	4.50	
185	10.00	5.50	
186	10.00	7.00	
187	10.00	9.00	
188	10.70	5.00	
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191	10.70	7.00	
192	10.70	8.00	
193	10.70	9.00	
194	10.70	10.00	
195	11.00	6.00	
196	11.20	6.10	
197	11.20	6.50	
198	11.20	7.50	
199	11 20	8.50	
200	11.20	9.50	
201	11.20	10.00	
202	11.25	1.25	
203	11.25	3.50	
204	11.25	4.50	
205	11.25	5.50	
206	11.25	6.00	
207	11.30	6.10	
208	11.30	6.50	
209	11.30	7.50	
210	11.30	8.50	

211	11.30	9.50	
212	11.30	10.00	
275	11.50	6.00	
213	11.80	5.00	
214	11.80	5.50	
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216	11.80	7.00	
217	11.80	8.00	
218	11.80	9.00	
219	11.80	10.00	
230	12.50	0.00	S
271	12.50	0.70	
231	12.50	1.25	
232	12.50	1.80	
233	12.50	2.50	
234	12.50	4.50	
235	12.50	5.50	
236	12.50	7.00	
237	12.50	9.00	
238	12.875	1.25	
240	12.975	1.00	
241	12.975	1.20	
242	12.975	1.30	
243	12.975	1.50	
239	13.00	0.70	
244	13.00	1.80	
245	13.20	5.00	
246	13.20	6.00	
247	13.20	8.00	
248	13.20	10.00	
249	13.50	1.20	
250	13.50	1.30	
251	13.80	3.50	

252	13.80	4.50	
253	14.00	0.00	S
254	14.00	0.70	
255	14.00	1.80	
256	14.00	2.50	
257	14.50	1.20	
258	14.50	1.30	
259	15.00	0.00	S
260	15.00	0.70	
261	15.00	1.20	
262	15.00	1.30	
263	15.00	1.80	
264	15.00	3.00	
265	15.00	4.50	
266	15.00	5.00	
267	15.00	7.00	
268	15.00	9.00	
269	15.00	10.00	

ELEMENT INCIDENCES

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9	44	52	47
10	45	44	47
11	45	47	53
12	47	52	53
13	52	78	77
14	53	52	77

15	53	77	79
16	77	78	79
17	78	89	88
18	79	78	88
19	79	88	90
20	88	89	90
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25	95	103	104
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31	125	276	127
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36	138	137	145
37	137	139	145
38	139	144	145
39	3	2	18
40	3	18	46
41	18	45	46
42	46	45	53
43	46	53	80
44	53	79	80
45	80	79	90
46	80	90	106
47	90	105	106

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49	106	125	135
50	135	138	146
51	138	145	146
52	146	145	162
53	145	161	162
54	145	144	161
55	162	161	173
56	173	161	181
57	162	173	182
58	173	181	182
59	182	181	202
60	202	181	230
61	202	230	271
62	271	230	239
63	239	230	253
64	239	253	254
65	254	253	260
66	253	259	260
67	202	271	231
68	231	271	240
69	231	240	238
70	238	240	241
71	241	240	249
72	240	239	249
73	271	239	240
74	249	239	254
75	249	254	257
76	257	254	260
77	257	260	261
78	231	238	243
79	238	242	243
80	243	242	250

81	244	243	250
82	244	250	255
83	250	258	255
84	255	258	263
85	258	262	263
86	232	231	243
87	232	243	244
88	202	231	232
89	202	232	233
90	233	232	244
91	233	244	256
92	244	255	256
93	256	255	263
94	256	263	264
95	4	3	26
96	3	46	26
97	26	46	67
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99	67	80	115
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101	106	135	115
102	115	135	146
103	115	146	140
104	140	146	163
105	163	146	183
106	146	162	183
107	162	182	183
108	183	182	202
109	183	202	203
110	163	183	184
111	184	183	203
112	203	202	233
113	203	233	234

114	234	233	251
115	233	256	251
116	251	256	264
117	251	264	265
118	4	26	27
119	27	26	48
120	48	26	67
121	48	67	68
122	68	67	91
123	91	67	115
124	91	115	116
125	116	115	140
126	140	163	164
127	164	163	184
128	184	203	204
129	204	203	234
130	234	251	252
131	252	251	265
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133	5	10	11
134	4	27	10
135	11	10	28
136	10	27	28
137	28	27	36
138	28	36	37
139	27	48	36
140	37	36	49
141	36	48	49
142	49	48	54
143	49	54	270
144	48	68	54
145	270	54	69
146	54	68	69

147	69	68	81
148	69	81	82
149	82	81	92
150	81	68	91
151	81	91	92
152	92	91	96
153	92	96	97
154	96	91	116
155	97	96	117
156	96	116	117
157	117	116	128
158	117	128	129
159	129	128	141
160	128	140	141
161	128	116	140
162	141	140	147
163	141	147	148
164	148	147	165
165	147	164	165
166	165	164	174
167	165	174	175
168	175	174	185
169	174	184	185
170	185	184	188
171	185	188	189
172	189	188	205
173	188	204	205
174	147	140	164
175	174	164	184
176	188	184	204
177	205	204	213
178	213	204	234
179	213	234	235

180	205	213	214
181	214	213	235
182	235	234	245
183	245	234	252
184	245	252	266
185	235	245	246
186	246	245	266
187	246	266	267
188	5	11	12
189	6	5	12
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192	13	21	22
193	6	13	14
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205	34	41	42
206	34	33	41
207	33	40	41
208	33	32	40
209	32	39	40
210	32	31	39
211	31	38	39
212	38	37	49

213	38	49	50
214	50	49	55
215	49	270	55
216	39	38	50
217	50	55	56
218	40	39	50
219	40	50	57
220	50	56	57
221	41	40	51
222	51	40	57
223	51	57	58
224	42	41	51
225	42	51	59
226	51	58	59
227	59	65	66
228	59	58	65
229	58	64	65
230	58	57	64
231	57	63	64
232	57	56	63
233	56	62	63
234	56	55	62
235	76	75	87
236	75	86	87
237	75	74	86
238	74	85	86
239	74	73	85
240	73	84	85
241	73	72	84
242	72	83	84
243	87	94	102
244	87	86	94
245	86	85	94

246	94	85	100
247	94	101	102
248	94	100	101
249	85	93	100
250	85	84	93
251	84	83	93
252	83	92	93
253	93	92	98
254	93	98	99
255	93	99	100
256	102	112	113
257	102	101	112
258	101	111	112
259	101	100	111
260	100	110	111
261	100	99	110
262	99	109	110
263	99	98	109
264	277	123	134
265	123	133	134
266	123	122	133
267	122	132	133
268	122	121	132
269	121	131	132
270	121	120	131
271	120	130	131
272	134	143	153
273	134	133	143
274	133	132	143
275	143	132	151
276	143	152	153
277	143	151	152
278	132	142	151

279	132	131	142
280	142	150	151
281	131	130	142
282	130	141	142
283	130	129	141
284	141	148	149
285	142	141	149
286	142	149	150
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288	153	152	159
289	152	158	159
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291	151	157	158
292	151	150	157
293	150	156	157
294	150	149	156
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310	178	186	192
311	186	191	192

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314	186	185	190
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316	176	175	185
317	185	189	190
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328	211	210	218
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332	209	208	216
333	208	215	216
334	219	218	237
335	218	217	237
336	237	217	247
337	217	236	247
338	217	216	236
339	216	215	236
340	215	235	236
341	215	214	235
342	236	235	246
343	219	237	248
344	248	237	268

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346	237	247	268
347	247	267	268
348	247	236	267
349	236	246	267
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351	12	19	21
352	19	20	21
353	19	29	20
354	19	11	28
355	19	28	29
356	29	28	272
357	30	29	272
358	31	30	272
359	31	272	38
360	28	37	272
361	272	37	38
362	55	270	60
363	55	60	62
364	60	61	62
365	60	70	61
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370	71	70	273
371	72	71	273
372	72	273	83
373	273	82	83
374	98	97	107
375	98	107	109
376	107	108	109
377	108	107	118

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379	107	97	117
380	119	118	126
381	120	119	126
382	120	126	130
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384	126	117	129
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386	149	154	156
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388	154	148	165
389	154	155	156
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391	154	165	166
392	167	166	274
393	168	167	274
394	168	274	176
395	166	165	274
396	165	175	274
397	274	175	176
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399	195	196	197
400	195	206	196
401	190	189	195
402	195	189	205
403	195	205	206
404	206	205	275
405	275	205	214
406	207	206	275
407	208	207	275
408	208	275	215
409	275	214	215
410	252	265	266

```
      411   83   82   92
      412   92   97   98
ELEMENT PROPERTIES
      1 TO 412 TYPE 'CSTG' THICKNESS 1.CC
      CCNSTANTS
      E 211CC.C ALL
      PCISSCN C.30 ALL
JOINT RELEASES
      1 TO 8 FCRCE Y
      139 144 161 181 230 253 259 FORCE X
$ FORCE APPLIEC = 10000 KG/CM , SIGMAO = 10000 KG/CM**2
LCADING 'CNE' 'UNIFORM'
      JOINT LCACS
      1 FCRCE Y -50.0
      17 44 52 78 89 FCRCE Y -100.0
      103 FCRCE Y -63.C
      114 FCRCE Y -13.C
STIFFNESS ANALYSIS
      LIST CISPLACEMENTS STRESSES ALL
```

LOADING - ONE UNIFORM

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.2019319	
2	0.0	-0.2012517	
3	0.0	-0.2010719	
4	0.0	-0.1930984	
5	0.0	-0.1884045	
6	0.0	-0.1830611	
7	0.0	-0.1842340	
8	0.0	-0.1842605	
139	0.0490257	0.0	
144	0.0460593	0.0	
161	0.0451241	0.0	
181	0.0375391	0.0	
230	0.0301626	0.0	
253	0.0262622	0.0	
259	0.0266258	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
9	0.0056779	-0.2005199	
10	-0.0057007	-0.1896487	
11	-0.0067895	-0.1877328	
12	-0.0064182	-0.1853298	
13	-0.0013789	-0.1845239	
14	0.0001942	-0.1841567	
15	0.0000976	-0.1842617	
16	0.0000251	-0.1842826	
17	0.0135303	-0.1986922	
18	0.0084880	-0.1977467	
19	-0.0102445	-0.1865546	
20	-0.0101109	-0.1868238	
21	-0.0046885	-0.1862653	
22	-0.0003315	-0.1852055	
23	0.0002283	-0.1843486	
24	0.0000567	-0.1842563	
25	0.0000261	-0.1842555	
26	-0.0022585	-0.1921741	
27	-0.0067840	-0.1884069	
28	-0.0121258	-0.1868350	
29	-0.0153171	-0.1866009	
30	-0.0218468	-0.1857866	
31	-0.0326195	-0.1849236	
32	-0.0509382	-0.1839907	
33	-0.0663199	-0.1832954	
34	-0.0810898	-0.1832286	

296

35	-0.0885186	-0.1832286
43	0.0166177	-0.1941437
272	-0.0203764	-0.1824622
36	-0.0130250	-0.1804371
37	-0.0172322	-0.1788149
38	-0.0240743	-0.1766981
39	-0.0426586	-0.1759909
40	-0.0588265	-0.1756635
41	-0.0736672	-0.1757778
42	-0.0885186	-0.1757997
44	0.0263463	-0.1893974
45	0.0163414	-0.1882674
46	0.0075937	-0.1873911
47	0.0267295	-0.1817896
48	-0.0130062	-0.1718265
49	-0.0228615	-0.1685044
50	-0.0437280	-0.1643615
51	-0.0735842	-0.1653446
52	0.0380125	-0.1742924
53	0.0232693	-0.1727671
54	-0.0222485	-0.1589400
270	-0.0282875	-0.1574702
55	-0.0344480	-0.1556863
56	-0.0448750	-0.1550974
57	-0.0584943	-0.1547625
58	-0.0734996	-0.1548821
59	-0.0884990	-0.1549050
60	-0.0370161	-0.1520597
77	0.0355526	-0.1637000
61	-0.0382819	-0.1492660
62	-0.0401840	-0.1490817
63	-0.0514722	-0.1481891
64	-0.0659213	-0.1474774
65	-0.0810022	-0.1474085
66	-0.0884990	-0.1474086
67	-0.0068541	-0.1532978
68	-0.0183072	-0.1500628
69	-0.0319758	-0.1484470
70	-0.0402905	-0.1482002
71	-0.0457563	-0.1467135
72	-0.0578252	-0.1459031
73	-0.0831363	-0.1454886
74	-0.1074181	-0.1452151
75	-0.1314650	-0.1451903
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APPENDIX 8

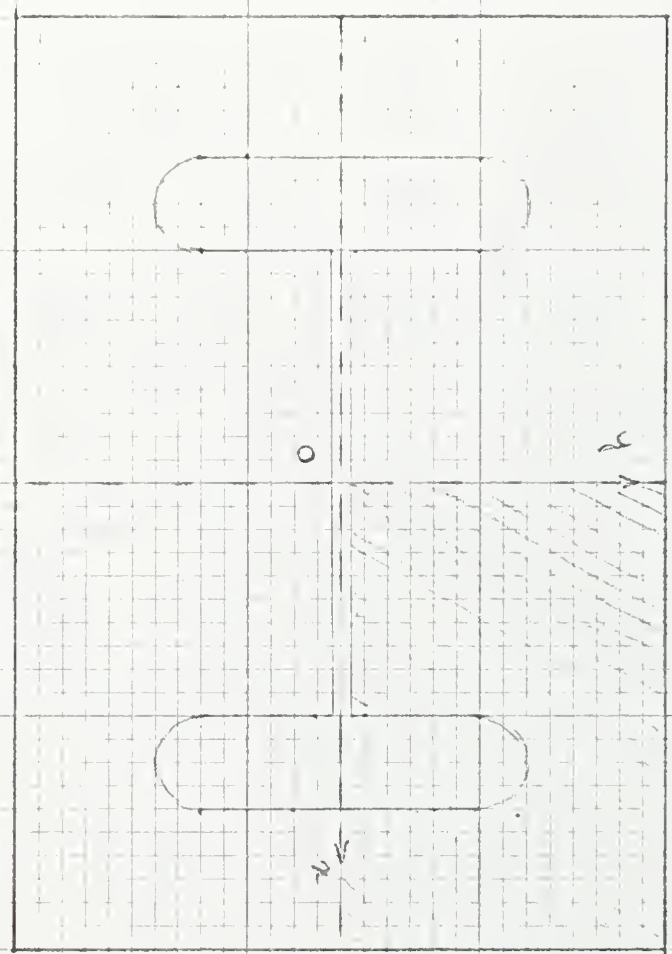
H-slit aluminum , 'CSTG' type .

The following presents :

1- Plate division , numbers are element names and node names , pages302, 303 .

2- Input data , pp 304 - 321 .

3- Output data , pp 322 - 325 .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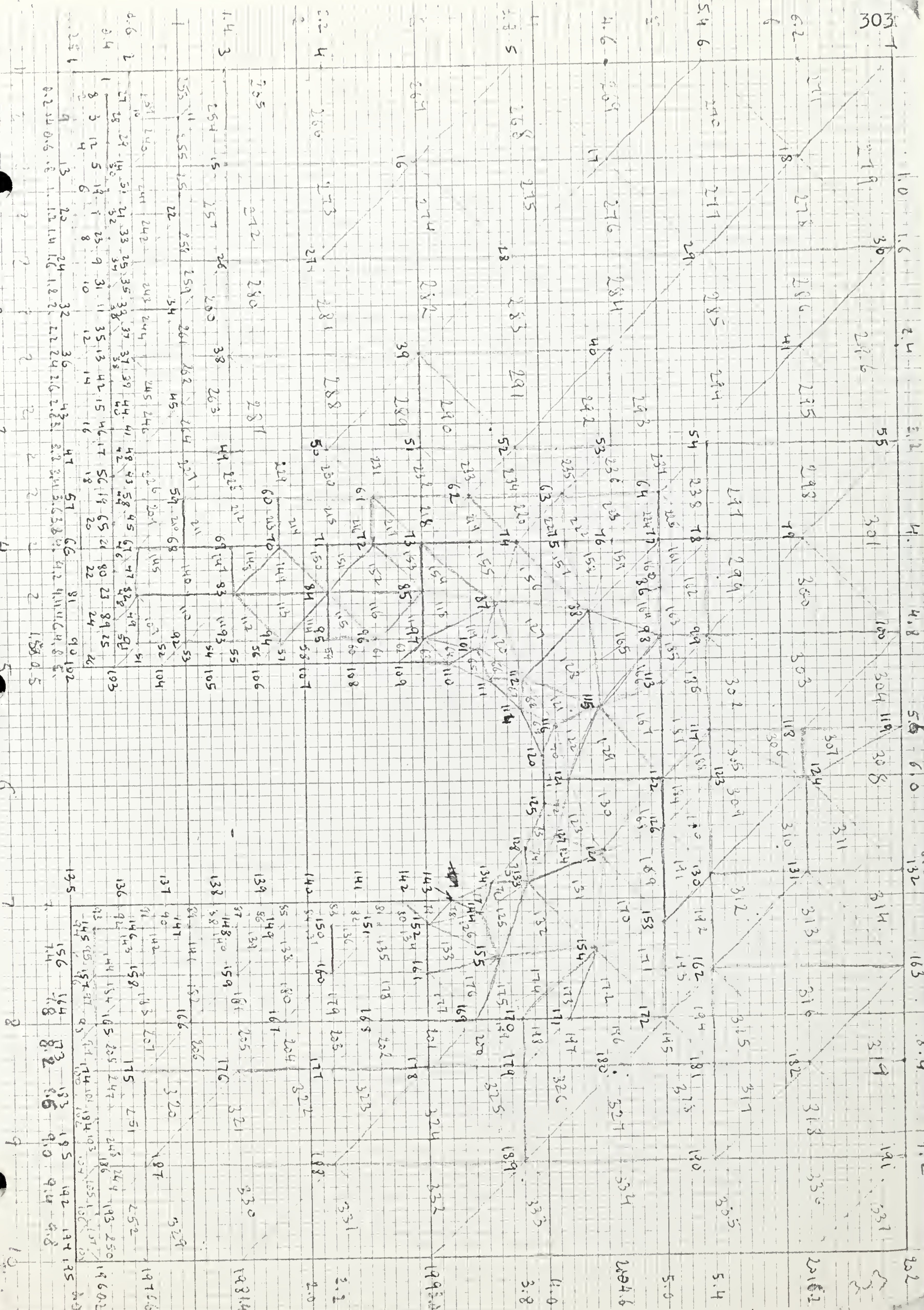

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     APPENDIX 8  'H-SLIT'  AL
TYPE PLANE STRESS
     UNITS INCHES
     UNITS POUNDS
JOINT COORDINATES
          1 0.0 0.125 S
          2 0.0 0.6 S
          3 0.0 1.4 S
          4 0.0 2.2 S
          5 0.0 3.8 S
          6 0.0 5.4 S
          7 0.0 7.0 S
          8 0.2 0.4
          9 0.4 0.125
         10 0.4 0.6
         11 0.4 1.0
         12 0.6 0.4
         13 0.8 0.125
         14 0.8 0.6
         15 0.8 1.4
         16 0.8 3.0
         17 0.8 4.6
         18 0.8 6.2
         19 1.0 0.4
         20 1.2 0.125
         21 1.2 0.6
```

22 1.2 1.0

23 1.4 0.4

24 1.6 0.125

25 1.6 0.6

26 1.6 1.4

27 1.6 2.2

28 1.6 3.8

29 1.6 5.4

30 1.6 7.0

31 1.8 0.4

32 2.0 0.125

33 2.0 0.6

34 2.0 1.0

35 2.2 0.4

36 2.4 0.125

37 2.4 0.6

38 2.4 1.4

39 2.4 3.0

40 2.4 4.6

41 2.4 6.2

42 2.6 0.4

43 2.8 0.125

44 2.8 0.6

45 2.8 1.0

46 3.0 0.4

47 3.2 0.125

48 3.2 0.6

49 3.2 1.4

50 3.2 2.2

51 3.2 3.0

52 3.2 3.8

53 3.2 4.6

54 3.2 5.4

55	3.2	7.0
56	3.4	0.4
57	3.6	0.125
58	3.6	0.6
59	3.6	1.0
60	3.6	1.8
61	3.6	2.6
62	3.6	3.4
63	3.6	4.2
64	3.6	5.0
65	3.8	0.4
66	4.0	0.125
67	4.0	0.6
68	4.0	1.0
69	4.0	1.4
70	4.0	1.8
71	4.0	2.2
72	4.0	2.6
73	4.0	3.0
74	4.0	3.8
75	4.0	4.2
76	4.0	4.6
77	4.0	5.0
78	4.0	5.4
79	4.0	6.2
80	4.2	0.4
81	4.4	0.125
82	4.4	0.6
83	4.4	1.4
84	4.4	2.2
85	4.4	3.0
86	4.4	5.0
87	4.5	3.6

89	4.6	0.4
88	4.6	4.4
90	4.8	0.125
91	4.8	0.6
92	4.8	1.0
93	4.8	1.4
94	4.8	1.8
95	4.8	2.2
96	4.8	2.6
97	4.8	3.0
98	4.8	5.0
99	4.8	5.4
100	4.8	7.0
101	4.889	3.460
102	5.0	0.125
103	5.0	0.4
104	5.0	0.8
105	5.0	1.2
106	5.0	1.6
107	5.0	2.0
108	5.0	2.4
109	5.0	2.8
110	5.019	3.193
112	5.152	3.848
111	5.169	3.556
113	5.2	5.0
115	5.4	4.5
114	5.446	3.831
116	5.540	4.111
117	5.6	5.4
118	5.6	6.2
119	5.6	7.0
120	5.807	3.981

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122	6.0	5.0	
123	6.0	5.4	
124	6.0	6.2	
125	6.193	3.981	
126	6.4	5.0	
127	6.460	4.111	
128	6.556	3.831	
129	6.6	4.5	
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131	6.8	6.2	
132	6.8	7.0	
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133	6.848	3.848	
143	6.981	3.193	
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136	7.0	0.4	
137	7.0	0.8	
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150	7.2	2.2	
151	7.2	2.6	
152	7.2	3.0	
153	7.2	5.0	

156	7.4	C.0	S
154	7.4	4.4	
155	7.5	3.6	
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158	7.6	0.6	
159	7.6	1.4	
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161	7.6	3.0	
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163	7.6	7.C	
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165	8.0	0.2	
166	8.0	1.0	
167	8.0	1.8	
168	8.0	2.6	
169	8.0	3.4	
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173	8.2	C.C	S
174	8.4	0.2	
175	8.4	0.6	
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180	8.4	4.6	
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183	8.6	C.C	S
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186	9.2	0.2	

187 9.2 0.6

188 9.2 2.2

189 9.2 3.8

190 9.2 5.4

191 9.2 7.0

192 9.4 0.0 S

193 9.6 0.2

194 9.8 0.0 S

195 10.0 0.0 S

196 10.0 0.2

197 10.0 0.6

198 10.0 1.4

199 10.0 3.0

200 10.0 4.6

201 10.0 6.2

202 10.0 7.0

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294	41	40	54
295	41	54	55
296	30	41	55
297	54	78	79
298	55	54	79
299	79	78	99
300	79	99	100
301	55	79	100
302	99	117	118
303	100	99	118
304	100	118	119
305	117	123	124
306	118	117	124
307	119	118	124
308	119	124	132
309	124	123	130
310	124	130	131
311	124	131	132
312	131	130	162
313	131	162	163

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314 132 131 163
315 162 181 182
316 163 162 182
317 182 181 190
318 182 190 191
319 163 182 191
320 176 175 187
321 176 187 188
322 177 176 188
323 178 177 188
324 178 188 189
325 179 178 189
326 180 179 189
327 180 189 190
328 181 180 190
329 187 197 198
330 188 187 198
331 188 198 199
332 189 188 199
333 189 199 200
334 190 189 200
335 190 200 201
336 191 190 201
337 191 201 202
ELEMENT PROPERTIES
  1 TO 337 TYPE 'CSTG' THICKNESS 0.50
  CONSTANTS
  E 10000.0 ALL
  POISSON 0.30 ALL
JOINT RELEASES
  1 TO 7 FORCE Y
  135 156 164 173 183 185 192 194 195 FORCE X
$ PLATE LENGTH=20.0, WIDTH=14.0
```

```
$ WELD WIDTH= 0.25
$ WELD LENGTH= 10.0
$H-BRANCH WIDTH=2.0,END CIRCLES ON H-BRANCH RADIUS=1.0,
$ H-BRANCH OVERALL HEIGHT=8.0
$  FORCE APPLIED 5*10**3 LBS/IN , SIGMAC=10**4 PSI
LOADING 'ONE' 'UNIFORM'
  JOINT LOADS
      1 FORCE Y -1.0
      90 FORCE Y -1.5
      102 FORCE Y -0.5
      9 13 20 24 32 36 43 47 57 66 81 FORCE Y -2.0
STIFFNESS ANALYSIS
  LIST DISPLACEMENTS STRESSES ALL
```

LOADING - CNE UNIFORM

RESULTANT JOINT DISPLACEMENTS - SUPPORTS

JOINT	X DISP.	Y DISP.	Z DISP.
1	0.0	-0.0734304	
2	0.0	-0.0732901	
3	0.0	-0.0730776	
4	0.0	-0.0729944	
5	0.0	-0.0730816	
6	0.0	-0.0730194	
7	0.0	-0.0720410	
135	0.0330964	0.0	
156	0.0337439	0.0	
164	0.0342816	0.0	
173	0.0347161	0.0	
183	0.0350607	0.0	
185	0.0352212	0.0	
192	0.0352238	0.0	
194	0.0350612	0.0	
195	0.0348052	0.0	

RESULTANT JOINT DISPLACEMENTS - FREE JOINTS

JOINT	X DISP.	Y DISP.	Z DISP.
8	0.0003838	-0.0733216	
9	0.0008696	-0.0733365	
10	0.0006991	-0.0731801	
11	0.0006163	-0.0730569	
12	0.0011350	-0.0731428	
13	0.0017161	-0.0730734	
14	0.0013750	-0.0729197	
15	0.0010726	-0.0726833	
16	0.0006284	-0.0725782	
17	-0.0003482	-0.0727473	
18	-0.0019166	-0.0722604	
19	0.0018617	-0.0727860	
20	0.0025135	-0.0726452	
21	0.0020233	-0.0724604	
22	0.0017853	-0.0723159	
23	0.0025314	-0.0722640	
24	0.0032360	-0.0720620	
25	0.0026106	-0.0718601	
26	0.0020396	-0.0715668	
27	0.0017743	-0.0713860	
28	0.0005670	-0.0714752	
29	-0.0021129	-0.0715338	
30	-0.0056385	-0.0705310	
31	0.0031328	-0.0715945	
32	0.0038582	-0.0713521	

33	0.0031329	-0.0711063
34	0.0028003	-0.0709076
35	0.0036385	-0.0708076
36	0.0043586	-0.0705442
37	0.0035580	-0.0702620
38	0.0029029	-0.0698338
39	0.0021158	-0.0694035
40	-0.0006033	-0.0695823
41	-0.0058528	-0.0691124
42	0.0040402	-0.0699404
43	0.0047221	-0.0696831
44	0.0038979	-0.0693519
45	0.0035501	-0.0690725
46	0.0043242	-0.0690407
47	0.0049454	-0.0688052
48	0.0041136	-0.0684317
49	0.0034790	-0.0677650
50	0.0032827	-0.0671759
51	0.0028714	-0.0668065
52	0.0016165	-0.0667331
53	-0.0005993	-0.0665969
54	-0.0039515	-0.0665549
55	-0.0119862	-0.0653671
56	0.0044948	-0.0681432
57	0.0050247	-0.0679629
58	0.0042538	-0.0675405
59	0.0038847	-0.0671682
60	0.0035397	-0.0663667
61	0.0035236	-0.0655600
62	0.0029068	-0.0650968
63	0.0010473	-0.0649150
64	-0.0023052	-0.0645870
65	0.0045575	-0.0673177
66	0.0049813	-0.0672186
67	0.0042944	-0.0667530
68	0.0039410	-0.0663348
69	0.0037252	-0.0658606
70	0.0036496	-0.0653360
71	0.0036651	-0.0647818
72	0.0037809	-0.0642043
73	0.0037941	-0.0636907
74	0.0027790	-0.0631182
75	0.0013413	-0.0627652
76	-0.0003738	-0.0625428
77	-0.0025117	-0.0622293
78	-0.0048646	-0.0619359
79	-0.0100906	-0.0614059
80	0.0045244	-0.0666168
81	0.0048639	-0.0665914
82	0.0042308	-0.0661061
83	0.0036249	-0.0651482
84	0.0036578	-0.0638036
85	0.0041040	-0.0621180
86	-0.0026128	-0.0594468
87	0.0041632	-0.0605264
89	0.0044326	-0.0660375
88	0.0011789	-0.0588728
90	0.0047234	-0.0660648
91	0.0041477	-0.0655852
92	0.0037909	-0.0651484
93	0.0035161	-0.0646391
94	0.0034570	-0.0640057
95	0.0034727	-0.0631787
96	0.0038370	-0.0620569
97	0.0043033	-0.0606865
98	-0.0027762	-0.0562197

99	-0.0056394	-0.0558311
100	-0.0189485	-0.0542302
101	0.0046222	-0.0584420
102	0.0046625	-0.0658193
103	0.0043145	-0.0655489
104	0.0038963	-0.0651744
105	0.0035645	-0.0647421
106	0.0033807	-0.0642461
107	0.0033242	-0.0635583
108	0.0034650	-0.0626866
109	0.0038693	-0.0613408
110	0.0043303	-0.0591816
112	0.0048875	-0.0550030
111	0.0050418	-0.0559023
113	-0.0028326	-0.0521471
115	0.0011778	-0.0507710
114	0.0060730	-0.0509330
116	0.0045610	-0.0491666
117	-0.0065178	-0.0467495
118	-0.0139220	-0.0462446
119	-0.0220553	-0.0454178
120	0.0072025	-0.0448302
121	0.0051331	-0.0417383
122	-0.0030292	-0.0416148
123	-0.0066800	-0.0412960
124	-0.0145966	-0.0411618
125	0.0091869	-0.0380371
126	-0.0027502	-0.0352666
127	0.0075689	-0.0332357
128	0.0119179	-0.0310369
129	0.0027760	-0.0315591
130	-0.0066030	-0.0297177
131	-0.0152785	-0.0300276
132	-0.0248739	-0.0300503
134	0.0151415	-0.0249421
133	0.0115719	-0.0255821
143	0.0186964	-0.0203147
136	0.0327808	-0.0025066
137	0.0320017	-0.0049034
138	0.0308047	-0.0073076
139	0.0291854	-0.0096803
140	0.0271258	-0.0120938
141	0.0246902	-0.0144947
142	0.0219683	-0.0171141
144	0.0162348	-0.0200919
145	0.0333668	-0.0011395
146	0.0327708	-0.0033322
147	0.0318128	-0.0055110
148	0.0303741	-0.0076824
149	0.0285711	-0.0098538
150	0.0262707	-0.0120431
151	0.0237362	-0.0143071
152	0.0207542	-0.0165378
153	-0.0019208	-0.0234477
154	0.0054706	-0.0192248
155	0.0151509	-0.0156351
157	0.0339205	-0.0008688
158	0.0334659	-0.0026149
159	0.0310711	-0.0060579
160	0.0269425	-0.0094164
161	0.0210298	-0.0125308
162	-0.0059966	-0.0186259
163	-0.0251634	-0.0191380
165	0.0345001	-0.0006635
166	0.0329406	-0.0032119
167	0.0295894	-0.0056314

168	0.0244524	-0.0078570
169	0.0174352	-0.0097382
170	0.0131787	-0.0105464
171	0.0084955	-0.0114080
172	-0.0009212	-0.0128492
174	0.0347890	-0.0004646
175	0.0342409	-0.0013873
176	0.0317474	-0.0028158
177	0.0273689	-0.0041833
178	0.0212485	-0.0054246
179	0.0133555	-0.0064867
180	0.0041968	-0.0075160
181	-0.0055496	-0.0082542
182	-0.0153042	-0.0087957
184	0.0351406	-0.0001661
186	0.0351503	0.0000761
187	0.0348302	0.0002307
188	0.0277874	0.0008040
189	0.0137354	0.0012130
190	-0.0051574	0.0011473
191	-0.0251415	0.0011087
193	0.0351286	0.0003403
196	0.0347258	0.0007609
197	0.0341270	0.0020204
198	0.0316787	0.0039048
199	0.0212414	0.0077101
200	0.0045618	0.0101940
201	-0.0150966	0.0109263
202	-0.0251017	0.0109661

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